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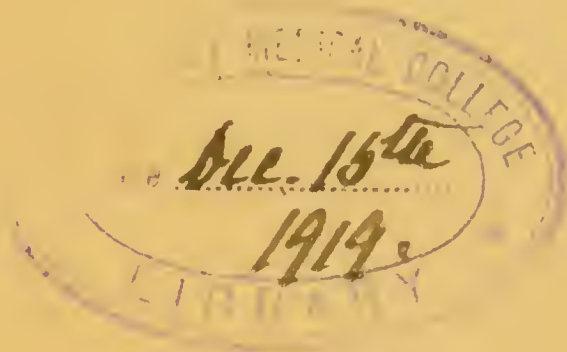
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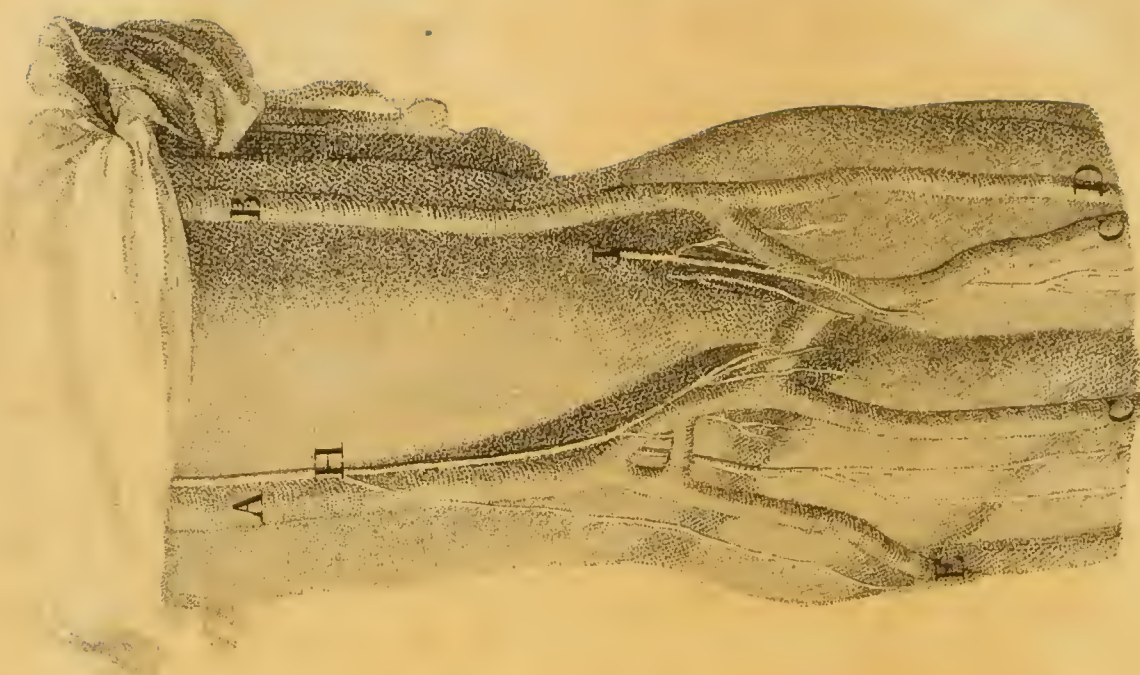
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SURGICAL OBSERVATIONS

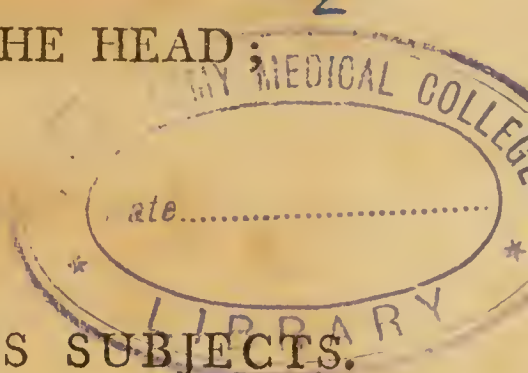
ON

INJURIES OF THE HEAD ;

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AND ON

MISCELLANEOUS SUBJECTS.



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SURGICAL OBSERVATIONS.

ON INJURIES OF THE HEAD.

SECTION I.

WHEN the Members of the Academy of Surgery in France, and Mr. Pott in England, severally inculcated to the surgeons of their respective countries, the propriety and necessity of trephining the cranium under various circumstances consequent upon injuries of the head, they probably recommended a too free and frequent performance of that operation. Such appears to be the opinion of many respectable writers who have published since their time; particularly of M. Desault of Paris, Mr. Dease of Dublin, and Mr. John Bell of Edinburgh. But al-

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though these writers unite in censuring the frequency of the practice, they are very far from being agreed in other respects; and many material points seem to me to require still further elucidation.

Believing that the observations, which I have had an opportunity of making at St. Bartholomew's Hospital, enable me to throw some light on this important and intricate subject, I am induced to submit to the public a short account of several cases that occurred there, and the inferences which I drew from them.

The difficulties connected with this part of surgery are sufficiently proved by this circumstance, that, notwithstanding it has at all times excited the attention of surgeons of the greatest talents, and possessing the most extensive field for observation, much difference of opinion still subsists, and the practice that ought to be followed in particular cases yet remains a matter of dispute. It is not, indeed, probable, that any part of medical science

science can in a short time receive all the improvement of which it is capable; for, in proportion as we advance in knowledge, we are led to remark many circumstances in the progress of a disorder, which had before passed without notice, but which, if known and duly attended to, would clearly point out to us the nature and remedy of the complaint. Hence, the records of former cases are of much less value, as the symptoms about which we are now anxious to inquire, have in them been entirely overlooked.

I was led to this remark by reading the Works of Hildanus, Wepfer, Du Quesnay, and others, wherein are to be found a number of interesting cases, which I have been precluded from mentioning, as the nature of them cannot be exactly ascertained in consequence of this deficiency.

Although I have been for many years attentive to the treatment of persons who had suffered injuries of the head, and also to the examination of the parts after death, where the case has terminated fatally; I still perceive

so many circumstances which require investigation, that I entertain no hope of ever being able to obtain, from my own experience, all the information which is wanted. I hope, however, that the hints offered in this Essay may have the effect of inducing surgeons to pay a closer attention to cases of this kind, and that thus, by their united observations, the public may at length become possessed of that knowledge, which the labours of an individual could never supply.

In the accounts which we have of the former practice in France, it is related, that surgeons made numerous perforations along the whole track of a fracture of the cranium; and, as far as I am able to judge, without any very clear design. Mr. Pott also advises such an operation, even with a view to prevent the inflammation and suppuration of the *dura mater*, which he so much apprehended. But many cases have occurred of late, where, even in fractures with depression, the patients have done well without an operation.

tion. To confirm the accounts that have been given of such cases, and by this means to counteract, in some degree, the bias which long accustomed modes of thinking and acting are apt to impress on the minds of practitioners, I shall relate the histories of five cases, that occurred at St. Bartholomew's Hospital in the space of twelve months; and afterwards offer a few remarks upon the subject. The principal circumstances only of each case are related; for, as many examples of the same kind are to be found in various surgical books, a minute detail of particulars seem to be unnecessary.

Cases of Fracture of the Cranium with Depression, which terminated favourably, although no Operation was performed.

CASE I.

A woman, about forty years of age, was admitted into the hospital for a wound on her head. About a week before she applied for advice her husband had knocked her down with a brass candlestick. She was stunned by

the blow, and lay for some time senseless; but, on recovering, she felt no other inconvenience than the foreness occasioned by the wounded integuments. She had suffered some slight indisposition since the accident.

On examining the head, the right parietal bone was found denuded about two inches in extent; a fracture of the same length was also to be felt; and the bone on one side of the fracture was depressed about the eighth of an inch. — She remained in the hospital a fortnight, without any bad symptom occurring, and was then, at her own desire, discharged, although the wound was not perfectly healed.

CASE II.

A boy, about twelve years old, received a kick from a horse in Smithfield, which stunned him; and he was immediately brought to the hospital. The integuments of the forehead were divided by the injury, and the lower part of the os frontis, and superciliary ridge of the frontal bone depressed at least a quarter of an inch below its original level;

level; the depressed portion measuring about an inch and a half in length.

It is obvious that the bone could not be thus depressed without a fracture of some part of the basis of the skull occurring at the same time, on which account the case might be considered as more dangerous. — In less than two hours he had recovered from the immediate effect of the blow, being at that time perfectly sensible. Fourteen ounces of blood were taken from his arm; his bowels were emptied by a purge; and saline medicines, with antimonials, were directed to be given. He went on tolerably well for two days, at the end of which time, evident symptoms of considerable irritation of the brain took place. He now complained of pain in his head; slept little; and, when dozing, often started, or was convulsed in a slight degree. To remove these symptoms, he was bled twice, took opening medicines occasionally, was kept quiet, and without light, and was allowed only a spare diet. By continuing this plan for about three weeks, he perfectly recovered.

CASE III.

A man between thirty and forty years of age, received a blow on the forehead from a brick thrown at him, by which the frontal bone was fractured about half an inch above the orbit: the fracture measured two inches in length, and the upper portion of the bone was depressed about the eighth of an inch. He was not even stunned by the blow, and walked to the hospital without assistance, complaining only of soreness in the wounded integuments. Sixteen ounces of blood were immediately taken from his arm; he was confined (much against his inclination) to a scanty and liquid diet, and was purged every second day. — This patient did not experience any illness; and the wound soon healed.

CASE IV.

A boy, about thirteen years old, had a fracture, with depression, of part of the temporal and parietal bones. By similar treatment, he also escaped without any material ill consequences; but in this case, part of the injured bone exfoliated.

CASE

CASE V.

A girl, thirteen years old, had a considerable fracture, with depression, of the left parietal bone. She was not brought to the hospital until ten days after the accident. When admitted, she was feverish, had pain in her head, and the little sleep she got was very much disturbed: but, by the use of bleeding, with antiphlogistic medicines and regimen, she soon got perfectly well.

The cases above related are not offered to notice on account of any striking peculiarity attending them, but merely to shew that such are not unfrequent, as they all occurred within the course of a year. From amongst a great number of similar cases, I shall select the two following, as the symptoms attending them were more violent than ordinary.

CASE VI.

A lad, seventeen years of age, had his head pressed between a cart-wheel and a post; by which accident the scalp on both sides was turned downwards, so as to expose the lower
half

half of the parietal bones, the squamous part of the temporal, and also part of the frontal and occipital bones ; about a quarter of the cranium being thus completely denuded. The periosteum was in several places stript off from the skull, the scalp much bruised, and the posterior and inferior angle of the left parietal bone was beaten in. The visible part of the depressed portion was an inch in length, and more than an eighth of an inch below the level of the cranium ; but the fracture extended along the squamous part of the temporal bone towards the basis of the skull : it could not, however, be traced, as the temporal muscle had not been removed from that part by the injury.—The scalp being cleansed was replaced, retained in its situation by slips of sticking-plaster, and a slight pressure by bandage was applied. The boy was perfectly sensible, his pulse regular, and not quickened. He had bled considerably from the temporal artery, which had been divided by the accident : eight ounces of blood were, however, taken from his arm ; and some purging medicine was administered next morning, which procured three or four stools.

stools. — The next day (*Friday*), his pulse beat nearly 120 in a minute; his skin was hot and dry; and he complained of pain in his forehead. Twelve ounces of blood were taken away, and four grains of pulvis antimonialis ordered to be given three times a day. On *Saturday*, the former symptoms still continued, and were rather increased. The antimonial powder made him sick, or at least increased his disposition to be so. Fourteen ounces more of blood were taken from him; the vibratory feel of his pulse not being altered until that quantity was taken away: the blood, on standing, appeared very buffy. His skin, notwithstanding all this, still remained extremely dry; some antimonial wine was given, which produced vomiting. On *Sunday*, his pulse was evidently lowered by the evacuations he had undergone, but it was still quick, and sufficiently strong. The pain of the head remained as before. Having a sufficient number of stools, and the sickness still continuing, the antimonial powder was omitted. He was bled, however, in the vena saphena, and his feet and legs were afterwards immersed in warm water; during which,

which, he, for the first time, perspired copiously. A blister was also applied to his neck. — The scalp united, with only a trifling suppuration over the fractured part of the bone; and to this ready union, the lowering plan, by preventing inflammation, seems very materially to have contributed. The matter collected over the fracture was discharged by a puncture, and the boy got well.

CASE VII.

A lad, eighteen years of age, had the squamous part of the temporal bone beaten in; the fracture ran horizontally, about a quarter of an inch above the zygoma, and could be distinctly traced with the finger, introduced through the torn scalp and temporal muscle, for two inches. The upper part of the bone was depressed about one-eighth of an inch; and it was impossible to trephine below the fracture in order to elevate the depressed portion. The lad had recovered from the immediate stunning occasioned by the injury; nor was there any symptom that indicated material derangement of the functions of the brain from the pressure which it sustained.

He

He was bled largely, and took a purging medicine, and was moderately well on the following day. On the second morning he was again purged; and when I saw him at noon nothing materially wrong appeared; but when I came to the hospital at eight in the evening I found he had gradually become delirious, and that he then could scarcely be kept in bed. His skin was hot, and his pulse frequent and strong. These symptoms could be attributed to nothing but inflammation of the brain; he was therefore immediately and largely bled. He now became quiet and manageable; but the next morning his replies to all questions were incoherent, his pulse frequent, his skin hot, and his tongue dry. The bleeding and purging were repeated, and at night a blister was applied to his neck. On the following morning he was sleeping and feeble, but his answers were rational; as the frequency and fulness of his pulse increased in the evening, he was again bled. The inflammation of the brain was now subdued, and the patient gradually recovered. The wound healed without any exfoliation of bone, and when he was discharged

charged from the hospital there was not the most trivial circumstance which could induce us to suspect that the brain had sustained any injury from the accident. His sleep was found and undisturbed, and the sudden motion of his head in any direction occasioned no giddiness or inconvenience.

It appears very clearly, I think, from these cases, as well as from a great number of others to be found in books, that a slight degree of pressure does not derange the functions of the brain, for a limited time after its application. That it does not do so at first is very obvious; as persons are often perfectly sensible, and free from head-ach and giddiness immediately after the injury. Whether it may not produce such an effect at some remote period, is not so easily determined, since this cannot be ascertained but by a continued acquaintance with the persons who had received the injuries. All, however, whom I have had an opportunity of knowing for any length of time after the accident, continued as well as if nothing of the kind had ever happened to them.

In Mr. Hill's Cases in Surgery, two instances of this sort are related; and Mr. Hill knew both the patients for many years afterwards, yet did not perceive any inconvenience to arise. It deserves to be mentioned too, that one of the patients was a sailor, and therefore, probably, led a life of irregularity as well as of exertion. The result of cases of this kind, which I have met with in authors, does not lead to the apprehension of any future mischief: nor is it easy to conceive that the pressure, which caused no ill effects at a time when the contents of the cranium filled its cavity completely, should afterwards prove injurious when they have adapted themselves to its altered size and shape. Severe illness, indeed, does often intervene between the receipt of the injury and the time of its recovery; and many surgeons might be inclined to attribute this to pressure; but it equally occurs where the depressed portion is elevated; several instances of which I shall have occasion to relate, and many others are to be met with in authors. This is a circumstance which nothing but very extensive experience can shew in a true light.

If,

If, for instance, a surgeon who was prepossessed with the opinion that elevation of the bone is necessary in every instance of depressed cranium, should have acted upon this opinion in the first, third, fourth, and fifth cases, and afterwards have employed proper evacuations, his patients might, perhaps, have had no bad symptoms, and he would naturally have attributed their well-doing to the mode of treatment which he had pursued: yet these cases did equally well without an operation. If the same surgeon had been witness to the disturbance which arose in the second, sixth, and seventh cases, he would, without doubt, have attributed them to the continuance of pressure made by the bone; yet these cases also did well by medical treatment only: and when the symptoms which come on thus, are of the inflammatory kind, they may generally be removed by the same means. Many cases also are to be met with in books, and some are related in the subsequent part of this Essay, where not only great but even fatal mischief ensued, notwithstanding the brain had been relieved from pressure at an early period. Another surgeon,

prejudiced against the use of the trephine, might, with equal injustice, consider the mischief, which ensues in certain cases, as entirely owing to the operation.

The degree of pressure, which the brain can sustain without great injury to the system, may probably vary according to the disposition of that organ to be affected by it, the suddenness of its application, and the direction in which it is made: and although it must be very difficult to obtain any precise knowledge on this subject, yet there is great reason to believe that the brain can bear more pressure without injury to it, than was formerly supposed. The first of these circumstances seems evident; for in some persons a slight pressure produces severe symptoms; whilst, in others, a much greater degree is borne without inconvenience. We can rarely judge of the effects of pressure when any part of the cranium is beaten in by a blow; for in that case the shock generally occasions stupefaction. Internal hæmorrhages, perhaps, afford us the best criterion whereby to determine the effects of pressure on the brain. The

eighth case will serve as an illustration of this remark, where it appears that a considerable hæmorrhage must have taken place before it deprived the patient of his faculties; for he walked home, undressed himself, and went to bed, after the trunk of the middle artery of the dura mater had been ruptured. In cases of apoplexy also, the hæmorrhage is generally very large before it produces those consequences which destroy life.

The authorities quoted by Morgagni, as well as his own observations, shew that people may recover from apoplexy even after a considerable effusion of blood has taken place. But as the records of such cases are not common, and as it appears to me that further confirmation of them would be highly useful, I have obtained permission of Mr. Wilson to mention a remarkable case of this kind, which occurred to his notice. — A gentleman fell down suddenly, and remained for some time in that lethargic state which is usual in apoplectic cases; but afterwards gradually recovered his faculties both of mind and body, and continued to exercise them

them very perfectly for two years, when a second attack of the same kind took place, and destroyed him. Upon opening the head, the cause of his death became evident; for a large quantity of blood was found in the ventricles, and at the basis of the cranium. But what seemed particularly worthy of attention, was a cavity in the right hemisphere of the brain, extending from the front to the back part of the cerebrum, being more than four inches in length, and more than an inch in breadth, Within this cavity were contained flakes of coagulated lymph, and a bloody-coloured fluid, which Mr. Wilson, whose abilities and accuracy of observation entitle his opinion to the fullest credit, was convinced were the remains of the blood extravasated at the first attack.

I also examined the brain of a gentleman, with whom, for the last five years of his life, I was intimately acquainted. When I first knew him, he was slowly recovering from a severe fit of apoplexy, which had paralysed the left side of his body. Though he could not raise his left arm to his head, nor move his left thigh and leg with freedom,

dom, yet he walked about moderately well, and could work in his garden. Every winter he was subject to fits of the gout, and every summer to such a plethoric and inflammatory state of the vessels of the head as to threaten another apoplexy. He was once immediately and most completely relieved from very distressing feelings from the latter cause, by the abstraction of ten ounces of blood from the temporal artery. The last fit of apoplexy, which I have mentioned, was the third, with which he had been afflicted. The first affected his speech, the second his right arm, and the third produced the effects which I have related. His bodily and mental powers remained however very vigorous, even during the five last years of his life. On dissection three apoplectic cells were found. One was situated superficially in the left lobe of the cerebellum, one in the left hemisphere of the cerebrum, and one, which had probably been the cause of the last and greatest degree of paralysis, in the middle of the right hemisphere of the brain. Nothing but the membranes, which immediately invest the brain, covered the effused substance, which
had

had become of a gelatinous nature. I do not exaggerate, when I say, that this cavity was large enough to have held six ounces of blood.

Though a slight degree of pressure does not immediately affect the functions of the brain, yet it may act in another way;—it may excite inflammation of that organ, as it does of other parts of the body. Its power in this respect, however, will probably lessen by the part becoming accustomed to it; and the cases on record, where fractures with depression have done well, as well as those of recovery from apoplexy, are proofs, that the cause which in the first instance was injurious by its pressure, may continue to exist without inconvenience. Such cases ought surely to deter surgeons from elevating the bone in every instance of slight depression, since, by the operation, they must inflict a further injury upon their patients, the consequence of which it is impossible to estimate.—From all, therefore, that I have learned from books, as well as from the observations I have made in practice, and from reasoning upon the
c 3 subject,

subject, I am disposed to join in opinion with those surgeons, who are against trephining in slight depressions of the skull, or small extravasations on the dura mater. In the latter, it is probable the compressing cause will soon be removed by absorption; and in the former, according to the observations of Mr. Hill * and Mr. Latta †, the bone will regain its natural level if the subject be young. In adults, however, and especially in persons of advanced life, this circumstance cannot be expected; so that in them the accommodation of the parts to each other, necessary for preventing future mischief, must be effected by a corresponding alteration in the form of the brain.

A circumstance, however, frequently occurs, that may render the surgeon doubtful as to what course he ought to pursue; this happens when, at the same time that the skull is slightly depressed, the patient labours under the effects of concussion. The circumstances, which generally serve to distinguish

* Cases in Surgery, p. 113.

† Pract. Syst. of Surgery, vol. ii. p. 172.

those two injuries, will be noticed hereafter. At present it is only necessary to observe, that, as the effects of the latter gradually abate, a little delay will enable the surgeon to decide upon the nature of the mischief, and take his measures accordingly. Where the patient retains his faculties, nothing farther is necessary than a continuance of the antiphlogistic plan; and should any inflammation afterwards take place, the same means, employed in a degree proportioned to the urgency of the symptoms, will in most instances be successful without elevating the bone. This happened in four of the six foregoing cases, which are related without any view to this particular point. — But if, from a peculiar disposition of the brain to be affected by pressure, the torpor of that organ should continue; or if, after inflammation of the brain has taken place, the pressure should then appear to be particularly injurious, the elevation of the bone ought not, I think, to be deferred. And from some of the cases related by Mr. O'Halloran, in the fourth volume of the Transactions of the Royal Irish Academy, it appears that this operation, if

not too long delayed, will give effectual relief under such circumstances.

The older surgeons certainly trephined unnecessarily, in consequence of their belief, that the brain was an organ of so delicate a structure, that the least degree of pressure would be highly injurious; whilst others, from having witnessed the frequent ill success attending the operation, and from having observed that many patients had recovered unexpectedly when it was omitted, seem inclined, too generally, to reprobate the practice. Under these circumstances, it appeared proper, by the recital of instances to shew, what kind of cases would probably do well without having recourse to it. With this view I have laid before the public the preceding cases; and I wish, in conclusion, to offer in this edition, a few additional Remarks on the circumstances which would influence my conduct with regard to the immediate performance, postponement, or omission of the operation.

The preceding cases shew, that in general there is no necessity for trephining in such fractures of the skull as occurred in them.

It

It may further be stated as an argument against the hasty performance of this operation, that it is likely to aggravate the inflammation of the brain, which in the majority of cases comes on in consequence of the injury.

If it can be shewn, that injury done to the scalp and bone, where there is no fracture or concussion may sometimes be productive of inflammation of the brain, it would then follow, that the injury inflicted on these parts in the operation of trephining would probably aggravate the inflammatory symptoms, which are to be expected to succeed to all violent blows on the head. To shew that disorder of the brain is likely to take place from its sympathy with the parts which contain that organ, I relate the following cases.

CASE VIII.

A coachman standing on a small ladder to clean the top of a carriage, slipped and fell, with his head against the window, which was drawn up at the time. The window being thus broken, the sharp edge of the
glass

glass divided and turned down the scalp to a considerable extent from off the parietal and frontal bones. In this state he came to my house, with the arteries bleeding profusely. I tied two of them, replaced the scalp, and sent him to the hospital: the next day he did not appear much indisposed; but after another day or two had elapsed, he suffered much from inflammation of the scalp, part of which was even in a sloughy state. The patient had, at the same time, violent fever, and great disorder of his stomach and bowels. Small doses of calomel and gentle aperients were given for the latter affections; and he also took saline, and other febrifuge medicines. After about a week had elapsed, the scalp assumed a much better appearance, the inflammation having subsided, and the sloughs being detached. Nevertheless, his febrile state became aggravated, and a kind of delirium and symptoms indicating inflammation of the brain, came on, which venæsection did not subdue. The patient died, and his head being examined, it was found, that the brain and its membranes had undergone considerable inflammation, which, from

the degree of effusion between the tunica arachnoidea and dura mater, and between it and the pia mater, appeared to have lasted for a considerable time.

CASE IX.

A man had the scalp bruised and torn down from off the frontal bone by the wheel of a cart. He was not stunned at all by the accident. The bruised scalp mortified and the bone was left bare. He remained in the hospital waiting for exfoliation, and as he had no illness, but little attention was paid to him. After about two months, however, he became weak, and ultimately delirious, and died; on examination an abscess containing about one ounce and a half of pus was found in the front lobe of the cerebrum, beneath the dead bone, and full half an inch from the surface.

If then irritation and inflammation of the scalp and bone may sometimes produce similar affections of the brain and its membranes, this very circumstance affords an argument for performing the operation in a
certain

certain description of cases, in which, indeed, its necessity may not be immediately apparent. I allude to those cases in which, though the bone be but slightly depressed, and may not occasion decisive symptoms of pressure, yet it may be broken into many pieces, and the scalp be so bruised, or otherwise injured, as not to be likely to unite by adhesion. Inflammation and suppuration must now ensue in the scalp, and some of the pieces of the bone will probably perish, and must be detached by tedious processes, which may induce disease in the subjacent membranes of the brain, as well as in that portion of the organ which they invest. I have therefore deemed it necessary to trephine in some cases of this description; and I think it will be useful to relate briefly one case of this kind. It will also serve as a contrast to that which immediately succeeds to it.

CASE X.

A drunken woman was knocked down on Blackfriars Bridge, by a blow with a cane, which had a round leaden head, about an inch in diameter. A circular piece of bone was
beaten

beaten in to the depth of a quarter of an inch, and starred or broken into many fragments. By dividing the scalp, I had the power of reflecting a portion of the integuments, so that I could trephine the bone, and remove the shattered and depressed pieces. I also took out a clot of coagulated blood as large as a walnut. The wound was closed by sticking plaster, a compress laid over the part, and bound on by sticking-plaster. The patient was largely bled, and a dose of purgative medicine was given.

It was difficult to determine whether the sleepy and stupid state of the patient was chiefly the effect of the injury or inebriety. She complained loudly during the operation. The next day, when the students of the hospital wished to examine whether the dressings were displaced or not, she refused to permit them; but on my entering the ward, she said, aye, now he is come, you may examine if you please. I need only add further, that a treatment calculated to prevent and controll inflammation was strictly persevered in, and that the patient shortly became perfectly well.

CASE XI.

June 3, 1802. A coachman, twenty-three years of age, was thrown from his box. The middle of the anterior edge of the right parietal bone was fractured, and a piece about the size of a sixpence was slightly depressed. He soon recovered from the stunning occasioned by the fall, and did not come to the hospital till the succeeding day. As he was perfectly well, he was but slightly bled, and no bad consequences of this injury appeared for two months. At this time he came again to the hospital, complaining of spasms in his left arm. The wound, which was not yet healed being examined, the depressed bone was found to be loose, and was removed, which alleviated the spasms. Soon afterwards a portion of the external table of the skull also came away. In the middle of September his health seemed much deranged, and he continued to get weaker till the middle of October. The dura mater had gradually become protuberant, and covered with a fungus; it at last gave way, and coagulated blood was discharged, mixed with detached pieces

pieces of the substance of the brain. The left arm had now lost its sensation, though the patient could feebly direct its motions. On the 17th of October the patient became very ill, and much bloody serum was discharged from the wound. He was delirious during the night, but on the next day understood all questions proposed to him; blood and brain were discharged through the wound. On the evening of the 19th he died. There was found a vacancy in the membranes of the brain, opposite to the deficiency in the bone, through which the effused blood and injured brain had been discharged. In other respects these membranes were perfectly found. The whole right hemisphere of the brain seemed to be reduced into a pulpy and fetid mass, composed of a mixture of blood and brain; except that the cortical substance, to the depth of about half an inch, remained found. This large cavity communicated with the left ventricle under the fornix.

It may be further stated as an argument against the immediate performance of the operation

operation of trephining, in cases where its necessity is dubious, that it deprives the brain and its membranes of that natural support which they receive from the bone. Under these circumstances, when inflammation comes on, the volume of the parts contained in the cranium, will be so considerably augmented by the præternatural distention of their vessels, and subsequent effusion of fluids, as to be protruded up into one aperture. The dura mater is likely to give way, and the pia mater becoming exposed, will be more subject to inflammation. It now sustains the pressure which was formerly supported by the dura mater, and in its turn ulcerates, and the brain will protrude and produce fungous excrescences. These circumstances are more particularly likely to happen in children; in them, indeed, the dura mater is so firmly connected with the bone, that it is rarely separated by accidental violence, and it is even difficult to tear off the bone, when it has been perforated by the trephine. The argument against immediately trephining the cranium, unless urged to it by great necessity, applies, therefore, more strongly to

to cases of children than to similar accidents occurring in adults. These remarks shew the necessity for the most copious evacuations after the operation of the trephine, in order to prevent as much as possible the augmentation of the bulk of the contents of the cranium by subsequent inflammation and effusion, and which is productive of the prejudicial effects above stated.

With a view to obviate these, the plan of treatment instituted by Mr. Mynors of Birmingham, highly deserves imitation. Having, by a simple division of the scalp, gained room for the application of the trephine, and removal of the depressed bone, he closed the wound attentively, and the scalp united by adhesion to the dura mater on which it lay. A gentle pressure, such as would give to the membranes of the brain that support which they were wont to receive from the bone, seems also likely to be useful.

There are, doubtless, some depressions of the skull that it would be absurd not to elevate by an immediate operation, for in

them the pressure on the brain would of itself be productive of fatal consequences. The arguments which I have stated against the immediate performance of the operation, apply therefore, in my opinion, only to dubious cases to those in which, perchance, upon the subsidence of the inflammatory symptoms, the pressure may be found not to be so great, but that it may be borne without detriment, though there is a risque that it may be detrimental.

Under these circumstances, by postponing the operation, we avoid the aggravation of the inflammatory symptoms which immediately succeed to the injury, and those consequences which arise from leaving an aperture in the cranium into which the contained parts are likely to be protruded. I say, by postponing the operation, because, if upon the subsidence of the inflammatory symptoms, the pressure by itself is found to produce prejudicial effects, we are still at liberty to perform it, nor is it likely to be attended with that violent inflammation which arises from the injury and operation conjointly.

There

There must be dubious cases, for a degree of pressure which might be borne in one person without inconvenience, may, in another, occasion a torpid state of the brain, or other symptoms requiring its removal. Mr. O'Halloran's cases appear, therefore, to me very valuable, because they shew that the operation of trephining will succeed under these circumstances ; and, I know, that it has been twice performed of late in London with perfect relief of those symptoms for which it was required, and without being followed by any inflammation which was not readily controlled.

SECTION II.

Injuries of the Head attended with Extravasation of Blood upon the Dura Mater.

In the three following cases the skull was broken, and depressed at the part which covers the middle artery of the dura mater, by which means that vessel was lacerated. The attention of surgeons has not been sufficiently directed to this event, although it is of the utmost importance; for the life of the patient might often be saved, if the nature of the accident were known, and the bone speedily perforated. — These cases likewise display, in a very striking manner, some of the effects caused by great pressure on the brain.

CASE XII.

A man was knocked down by the iron hooks of a crane, which fell upon his head from a considerable height. He was stunned at first, but soon recovered his powers of mind and body so far as to walk home, undress himself, and go to bed. A surgeon
was

was sent for, who, on his arrival, found the man senseless, and in a deeply apoplectic state. The patient was immediately brought to St. Bartholomew's Hospital, when the functions of life seemed nearly suspended, as he was almost without sensation, his breathing being slow, irregular, and stertorous, with an unequal, intermitting pulse, and cold extremities. — The scalp covering the right parietal bone was wounded; and on dividing it more extensively, a fracture with depression was discovered, running obliquely across the anterior and inferior angle of the parietal bone, over the temporal bone, and extending to the basis of the cranium, before the mastoid process. Several perforations with the trephine were made along the course of the fracture, and the depressed portion taken away. A surprising quantity of coagulated blood was found upon the dura mater; the coagulum being not less than an inch and half in thickness, and six or seven inches in circumference. On the removal of this coagulum, the brain, which had been indented by its pressure, remained in the same state as before, nor did it ever regain its ori-

ginal level; so that the patient experienced but little benefit from the operation, and he died about twelve hours after receiving the blow.

The dura mater, in this case, was not torn through in any part; so that the blood could not have come from any vessel within that membrane. The source of such a profuse hæmorrhage, however, could not be doubtful, when it was known that the fracture crossed, and had probably wounded, the principal artery of the dura mater; yet that vessel did not bleed after it was exposed.

CASE XIII.

A boy, about fourteen years of age, fell from a scaffold near two stories high, and pitched on his head. When brought from Islington to the hospital, he appeared to be almost in a dying state. The anterior inferior angle of the parietal, and part of the frontal bones, were found depressed. A piece of the cranium being taken out with the trephine, I discovered beneath it a large quantity of coagulated blood; I therefore made the next perfora-

perforation nearer to the trunk of the principal artery of the dura mater, from which I concluded that this hæmorrhage had taken place. Having gently removed some of the coagulum, and introduced my finger into the aperture which had been made, I passed it as far as the second joint, before I could touch the dura mater. Fluid arterial blood now gushed out in such quantities as to keep the bone covered on which I was next to trephine. I ran no risque, however, in performing the operation; for the dura mater was depressed so much that it could not be injured. But to guard against even the possibility of such an accident, I introduced my finger between the dura mater and skull, and then perforated the bone with the trephine. Having thus removed a third piece, which was directly over the principal artery, I took out about four ounces of coagulated blood; upon which the dura mater quickly rose to its original level, and the hæmorrhage from the wounded artery ceased. I now entirely removed the depressed portion of bone, and thus uncovered all the dura mater which had been detached; so that I could distinctly feel

its connection with the cranium all round. This satisfied me that no more extravasated blood was left behind. — The lad, who at the beginning lay quite insensible, with a feeble, intermitting pulse, and laborious interrupted respiration, became restless, and expressed sensations of pain towards the latter part of the operation. Being now asked, how he found himself? he replied, very well; Whether his head ached? he answered, no; If he was sure that he felt no pain? he said he was sure, and wished we would leave him alone. — I now took twelve ounces of blood from his arm, and he was put to bed, where he passed the night quietly. The next morning his bowels were completely emptied by a purge; and saline medicines, with antimony, were given, so as to keep the skin in a gentle state of perspiration. During the day he was sleepy, and lay quiet; answered questions very rationally, and complained of pain and giddiness in his head. — The third day he was disturbed, and less rational. Eight ounces of blood were taken from him, and a blister was applied to his neck. These means relieved him greatly, and he became quite tranquil

tranquil and collected. — On the sixth day, symptoms of irritation again took place, and were again relieved by similar treatment. The dura mater had granulated, and the whole wound looked healthy. Every thing went on remarkably well until the fifteenth day, when the patient was seized with rigor and pain in his head, and the healthy aspect of the wound was also changed. The following day, there was perceived, in the middle of the exposed dura mater, an aperture through which a protrusion of the brain arose, covered by the pia mater, which retained its natural appearance. In less than twenty-four hours this tumor increased to the size of an orange; its surface was dark-coloured, and irregular, and the pia mater no longer distinguishable. The following morning the boy died; and his friends had removed the body from the hospital before I knew of his decease.

I regretted very much that I could not examine the nature of this fungus or hernia cerebri, as it was a phænomenon which I had more than once contemplated with surprise,
and

and the nature of which I was afterwards fortunately enabled to ascertain.

CASE XIV.

A man was knocked down in Smithfield by a brick-bat, thrown at him by some villians against whom he had appeared as evidence upon a trial. He was immediately brought to the hospital; but in a state of profound apoplexy. — The right side of the frontal bone, and the lower part of the parietal, were beaten in; the area of the depressed piece being two inches in diameter. After making three perforations in the circumference, I was enabled to remove the depressed portion. I then took out a large handful of coagulated blood, which lay upon the orbitary process of the frontal bone, and had so pressed back the anterior lobe of the brain, that I could, with my finger, touch the transverse spinous process of the sphenoid bone. The brain now rose slowly, in consequence, I suppose, of the blood gradually finding its way through the compressed vessels; and the man began to shew signs of returning sense. — He was bled, and his bowels were emptied by a purge.

The

The next day he was so far recovered as to give an imperfect account of the accident ; but on the third day, he died convulsed.

On dissection, some blood was found between the dura and pia mater, and traces of inflammation appeared on the latter membrane.

Mr. Hill, of Dumfries, relates a case (the fifth), where the artery of the dura mater was ruptured without either fracture or depression of the skull ; and when he trephined a second time, four days after the accident, he found so large a coagulum of blood lying upon that membrane, as to make him afraid of removing it all at once : but on taking out a few ounces of it, the patient, who had hitherto lain in a state of apoplexy, looked up, on being spoken to, like one awakened from sleep, — knew, and named every body, and raised the arm belonging to the opposite side, which had been paralytic from the time of the accident,

In Mr. Latta's Surgery also, a similar case (as shewn on dissection) is related, in which
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an uncommon slowness of the pulse, and coma without stertor, were the symptoms produced.

These cases shew that a fracture of the skull is not likely to be followed by an equal degree of extravasation in every part, as the vessels connecting the dura mater to the cranium are, in most parts of that membrane, of a small size. If these are accidentally ruptured, a slight hæmorrhage ensues, which soon stops, and only a thin stratum of coagulated blood is found when the bone is removed. But if the fracture happens in the track of the principal artery of the dura mater; if the trunk, or even a considerable branch of that vessel be torn, the hæmorrhage will be profuse, and the operation of the trephine become immediately necessary to preserve the life of the patient. In the three cases that I have related, the operation was done very shortly after the accident: in the first case, the brain was so compressed that it did not regain its level; in the third, it rose slowly

as the blood found its way through the vessels; and in the second, it rose quickly, and the functions of the brain were as quickly restored. It can scarcely be doubted, then, that if the operation had been performed in these cases as soon as it became necessary, when, perhaps, only one instead of many ounces of blood were poured forth from the torn vessel, the lives of the patients might have been preserved.

It is of great importance to distinguish accurately the nature of such cases; and the distinction is not difficult when there is an interval of sense between the blow and the stupor occasioned by the effused blood. In the first related case, for instance, the nature of the accident was made sufficiently evident by this circumstance. But though we are assured that the patient labours under the effects of compression, we cannot, in many instances, know the situation of the compressing cause. In other cases, again, where there is no interval of sense after the accident, we are at a loss to determine whether the senseless state be the effect of compression or
of

of concussion. Every surgeon must acknowledge that it would be a very desirable thing to ascertain when blood is effused between the dura mater and the skull; for if the extravasation has happened in the more interior parts, a surgical operation is not likely to afford relief*. Now, if the extravasation which compresses the brain, be situated immediately beneath the bone, I think there are signs by which it will be disclosed; and as sufficient notice has not been taken of these, I wish particularly to call the attention of surgeons to them.

* In those cases, which I have seen, where blood was extravasated between the dura and pia mater, and a division of the former membrane was made for its discharge, in some instances the serous part of it only could be evacuated; for the coagulum was spread over the hemisphere of the brain, and had descended as low as possible towards its inferior part; in others, though a portion of the effused blood was discharged in a fluid or grumous state, a considerable quantity which was coagulated remained behind, so that very little relief was obtained by the operation. It seems then, that extravasation between the dura mater and the cranium is almost the only case which admits of being remedied by the use of the trephine.

I have

I have already said, that, unless one of the large arteries of the dura mater be wounded, the quantity of blood poured out will probably be inconsiderable; and the slight compression of the brain which this occasions, may not be attended with any peculiar symptoms; or perhaps it may occasion some stupor, or excite an irritation disposing the subjacent parts to become inflamed: but both these effects will gradually abate, nor will any inflammation ensue, if proper means are taken to prevent it. It is indeed highly probable, that, in many cases which have done well without an operation, such an extravasation has existed. But if there be so much blood on the dura mater as materially to derange the functions of the brain, the bone, to a certain extent, will no longer receive blood from within; and by the operation performed for its exposure, the pericranium must have been separated from its outside. I believe that a bone so circumstanced will not be found to bleed; and I am, at least, certain, it cannot, with the same freedom and celerity as it does when the dura mater remains connected with it internally. I
need

need hardly say, that, in the cases which I have related, there was not the least hæmorrhage. But it is right to mention, that I have also twice been able, by attending to the want of hæmorrhage from the outside of the cranium, to ascertain the extent to which the dura mater was detached within; and very frequently, when symptoms appeared to demand a perforation of the skull, I have seen it contra-indicated by the hæmorrhage from the bone, and, as the event has proved, rightly.

When the bone has remained long bare, the case may become perplexing. I once scraped a portion of the cranium which had been some time denuded, and found that it bled in such a manner, as, in my opinion, sufficiently to point out the adhesion of the dura mater, and of course the inutility of employing the trephine*.

* In aged persons, and in those in whom the circulation has been rendered languid by the accident, the mode of distinction which I have pointed out, may indeed be less conclusive.

Where

Where the extravasation on the dura mater is but small, it will probably not require any operation. A slight hæmorrhage from the bone, which may happen from the anastomosing of the vessels within its substance, will not, in this case, lead to any injurious error. But from what I have observed, I am inclined to believe, that even a small effusion of blood will diminish the hæmorrhage from the superincumbent bone.

Mr. Pott had an idea, that the bone would perish when the dura mater was detached for a considerable space from its inside; and some cases which he has related, seem to favour this opinion: but many other cases to be met with in authors, and many which have occurred to my observation, prove that the opinion was not well founded. Indeed we cannot suppose that the bone would perish from this cause; for it still receives blood, not only from the anastomosing of vessels within its substance, but also from the pericranium externally; and the success which has of late attended the operations for aneurism in the lower limbs, shews that parts of great bulk

and vascularity will continue to live when their usual supply of blood is very much diminished. If, however, the dura mater should be detached for a considerable extent from the inside of the skull, at the same time that the pericranium should also be stripped from its outside, I am inclined to believe that a portion of the bone would, in that case, die and exfoliate.

SECTION III.

Cases of Fungus, or Hernia Cerebri.

CASE XV.

A MAN, about forty years of age, was knocked down, and had a considerable part of the parietal bone, near the coronal suture, depressed, by a stone falling on his head from a high building. A portion of bone was taken out, and the depressed piece elevated. The patient, after this, seemed to obtain great relief from the stupor under which he had till then laboured. But the next day, he became very restless and delirious, and frequently endeavoured to get out of bed. Evacuations were prescribed, and a blister applied to his head, by which means the symptoms were lessened, but did not entirely go off; they continued near six days, only varying somewhat in degree. His strength was now very much reduced; and though he became more tranquil, he was still delirious, and a coma supervened, which

increased daily. — On the tenth day, upon uncovering the wound in order to dress it, a hernia cerebri appeared, rising through an ulcerated opening in the dura mater. The tumour at this time was not larger than a pigeon's egg; the pia mater, stretched over its surface, was inflamed; and a turbid serum oozed at its side from beneath the dura mater. On the following day, the tumour had acquired the size of a hen's egg, was still smooth on its surface, and apparently ready to burst. On the day after, before the time of dressing, the man died. — Upon examining the tumour now, it was found larger than before, and of a dark colour, with an irregular granulated surface; which appearance seemed owing to coagulated blood which adhered to its surface, as the part had bled so much, that one half the cap which the man had worn, was rendered quite stiff by it. In raising the top of the skull to inspect the contained parts, the tumour was in some degree torn from its basis. The pia mater was in general much inflamed, and, as well as the dura mater, was deficient at the place where the tumour protruded. A part of this tumour
being

being cut off where it was lacerated, appeared to consist of coagulated blood of a fibrous texture. The brain was now taken out, and the tumour carefully examined, when it was found to be of the same nature throughout, and to have originated within the substance of the brain, about an inch below the surface; but I could not discover the open vessel from which the hæmorrhage had proceeded.

The appearances, on dissection, clearly explained the cause of the symptoms which had taken place, and rendered it evident, that the disease under which this man had chiefly laboured, was inflammation of the pia mater. The nature of the tumour, also, was not less satisfactorily pointed out. It was plain, that, in consequence of the brain being injured to some depth beneath the surface, disease of the vessels, and consequent effusion of blood, had ensued; that the effusion was for a time restrained by the superincumbent brain and its membranes; but these gradually yielded to the expansive force exerted from within, and at last giving way altogether, the fluid blood oozed out and

congealed upon the surface of the tumour. It appears very probable, that the disease frequently described by the term *hernia cerebri*, consists, as in this instance, of a tumour formed by coagulated blood; for an organized fungus could hardly be produced in so short a time as that in which these tumours are usually formed.

CASE XVI.

A carpenter, while at work in a newly-built house, was crushed by a part of the wall falling in upon him. His abdomen was bruised, his clavicle broken, and his head wounded. Beneath the wounded scalp, the right parietal bone was found fractured and depressed. He was slightly comatose for many hours after being brought to the hospital, yet answered rationally to those questions that were put to him. As the coma, however, remained, and his pulse did not beat with the freedom that is usual, the surgeon under whose care he was admitted, thought it right to trephine him. Accordingly, one perforation being made, the depressed bone was elevated. No blood was found
upon

upon the dura mater, nor did any thing indicate the propriety of using the trephine a second time. The patient was largely bled; and saline medicines, with antimony and opium, were given. As he complained much of pain in his belly, fomentations were applied to this part, and clysters administered occasionally. He was again bled on the second and fourth days after the operation. At the end of a week the antimony was omitted, on account of his weakness; and he seemed to get rather better, until December 7, twelve days after the accident, when a hernia cerebri appeared, rising through an aperture in the dura mater, opposite to the perforation in the skull. It increased rapidly in size, and exhibited the same appearance described in the foregoing case. — Two days after this, the patient died.

On examining the head, the dura mater was found every where adherent to the skull; but on its inner layer there was a secretion of pus. The hernia cerebri, which had pushed up through an ulcerated opening in the dura mater, was of a fibrous texture, and evidently

formed of congealed blood deposited in the medullary part of the cerebrum; the containing cavity being about an inch diameter, and its parietes appearing to be the substance of the brain condensed by pressure. I was equally unsuccessful here in my search after the vessel, whence the blood had issued. The ventricles of the brain were full of a serous fluid mixed with blood, and a large abscess was also found in the spleen. — In this case, the mental faculties were not deranged as in the former. Both the symptoms and dissection shew the disease to have consisted in the effects of concussion, with inflammation of the dura mater, and subsequent effusion into the ventricles of the brain.

The opinion I had formed respecting the nature of *hernia cerebri* was now confirmed; and I think it received additional illustration from the following case, although the disease was in a different part of the body. — A patient in the hospital had a disease in the head of the tibia, from whence there arose an unhealthy fungus, which Mr. Blicke removed; and afterwards, the bone was kept
bare

bare by caustic applications, in hopes that a separation of the diseased parts would take place. The patient, however, became feverish, and his health was much impaired. On the cessation of the fever, there suddenly arose, within the wound, a fungus-like substance, about the size of a large apple, which seemed to sprout from the bone; it was of a livid colour, and its surface appeared as if covered with sloughs. I took off the tumour, which was nothing but coagulated blood, with the knife; and some blood oozed from its basis, but the hæmorrhage was stopped by the application of lint. In a few hours, however, a similar fungus-like tumour arose. As both the size and situation of the open vessel were unknown, and as the patient could neither support the loss of much blood, nor the irritation which an extensive wound, made in search of the artery, together with that arising from the diseased bone, would infallibly produce, it was judged best to remove the limb. This was accordingly done; and upon injecting water into the popliteal artery, it was found to be a branch of that vessel which had given way.

It seems that Paré, and the surgeons who lived about his time, often mistook the tumours that arose out of the cranium, for aneurisms, on account of their pulsatory motion. M. Louis, in the *Mem. de l'Acad. de Chirurgie*, tom. V. has well distinguished the nature and treatment of those proceeding from diseases of the dura mater or bone. There may, perhaps, be tumours of various kinds arising from the pia mater and brain; but if there are such, I believe they have not been discriminated; and the accounts given of many of them by authors, are similar to those just recited. They have generally been treated of under the name of fungus or hernia cerebri; and if the effused blood of which they consist, ever acquired vascularity, they might then deserve that title: but none of those that I have just noticed were of an organized structure. — Their formation seems to proceed from an injury done to a part of the brain by concussion or contusion, which has terminated in a diseased state of the vessels, similar to what occurs in apoplexy. The morbid state increasing, one or more vessels give way, and an effusion of blood into the substance

substance of the brain ensues, which, if the skull were entire, would probably occasion apoplexy, but, where there is a deficiency of bone that allows it to expand, presses the surface of the brain and its meninges through the vacant space. The dura mater soon ulcerates, and the tumour pushing through the openings, now increases with a rapidity proportioned to that with which the hæmorrhage takes place within. At last, the pia mater, and the stratum of the brain which cover the effused blood, are so extended as to give way, and the blood oozes out and coagulates. — Thus, the quick growth, and all the other phænomena observable in these tumours, are satisfactorily accounted for.

The plan of treatment to be adopted with tumours of the kind which I have described, is next to be considered; but as I have had no opportunities of acquiring knowledge as to the treatment of these diseases, since I became acquainted with the nature of them, I can only offer a few general remarks on this subject.

Where

Where no bad symptoms precede the appearance of the tumour, or where they go entirely away upon its being freed from the confinement of the dura mater, it may, perhaps, be most prudent not to interfere in the treatment of the complaint: for probably the hæmorrhage will cease, and the coagulum will drop off in pieces *, or gradually waste away, and be no more renewed †. All that appears necessary, then under such circumstances, is to cover the tumour and sore with some mild dressing, carefully avoiding all pressure, which both reason and experience shew is likely to be attended with bad consequences. Should the bulk of the tumour, however, become inconvenient, or render pressure from the dressings unavoidable, the practice which present experience has shewn

* See a case in the Edinburgh Medical Commentaries, vol. i. p. 98, where the tumour continued to increase for fourteen days, and had acquired the size of a goose's egg, when it dropped off in pretty large pieces. A similar case is related in the Medical Museum, vol. iv. p. 463.

† Fabricius Hildanus relates a case in his Fifteenth Observation, where the tumour arising from the brain became, in 24 hours, as large as a hen's egg, and afterwards gradually disappeared,

to

to be most successful, consists in occasionally paring off the tumour with a knife. In this manner Mr. Hill treated several cases with success.

But if the tumour continues to increase, and if the patient suffers a train of bad symptoms, apparently arising from irritation and pressure made on the brain, some further attempt to relieve him seems to be required. Under these circumstances, we have reason to suspect that the coagulum, from want of room to protrude, is enlarged internally; or that by plugging up the orifice in the bone, it prevents the escape of some fluid collected within the cranium*. The obvious mode
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* Mr. Hill, in relating a case of this kind, says, that he “was obliged to shave away the tumour, and push a lancet into its root as often as the stupor and other symptoms shewed that matter was lodged there, by which the patient was uniformly relieved, and afterwards recovered.” — (See his Cases in Surgery, p. 91-2.) But very different was the event in two similar cases (one is recorded by Scultetus, in his *Armamentarium Chirurgicum*, Obs. XIX.; the other in the *Lond. Med. Journal*, vol. x. p. 277.), in which repeated attempts were made to prevent the

of relief here appears to be, to enlarge the opening in the bone in proportion to the extent and increase of the tumour. Many surgeons have objected to the removal of much of the cranium, lest protusions of this kind should ensue; but it is evident that these tumours arise from an injury and consequent disease of a part of the brain, the event of which must be more fatal if the bone were entire. A large removal of bone was formerly a frequent event; but a protrusion of this kind very seldom took place.

But although, by thus allowing a free escape to the effused blood, we may prevent the injurious effects of its pressure on the brain, yet the degree of hæmorrhage may endanger the life of the patient.

the growth of the tumour by compression: one patient died at the end of a month; the other not until nearly six months after the accident. In the brain of each there was found, upon dissection, a large cavity, which had been formed by the accumulation of a fluid that could not escape, on account of the aperture in the bone being closed by the tumour.

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The quantity of blood effused will depend on the magnitude of the vessels, or on their disposition to bleed. As the disease is generally situated not far beneath the surface of the brain, there is less risque of its proceeding from the former cause. If it arises from the latter, it is very likely that the distention caused by the confinement of the effused blood would irritate the vessels, and keep up their disposition to hæmorrhage; therefore the treatment already recommended is likely to diminish it. But should the quantity of the hæmorrhage seem to threaten the life of the patient, I should think it most proper to take away the coagulum, and to expose the cavity in the brain, in order to learn whether suffering some sudden loss of blood to take place, together with the exposure of the bleeding vessels, might not produce a beneficial change, and a cessation of the hæmorrhage. I am induced to propose this mode of conduct, from reasoning founded on analogy: for in other parts of the body a hæmorrhage will sometimes continue, notwithstanding a considerable pressure made by a large quantity of coagulum, together with
that

that which the resistance arising from the closure of the external opening, and that which is occasioned by the dressings, conjointly produce. Yet, upon exposing the bleeding surface, the hæmorrhage will cease, and never afterwards be renewed.

I am still further induced to propose this plan of treatment, because I do not perceive any other which carries with it a probability of success. The impropriety of attempting to restrain the hæmorrhage by pressure has been shewn; ligatures cannot be applied, and styptics are known, by experience, to be dangerous.

I shall extract one case from the first volume of the *Memoires de l'Academie de Chirurgie* *, to shew that the removal of the coagulum is not likely to be attended with any alarming consequences. — A young man received a blow on the right parietal bone, which occasioned a fracture; some bone was

* See the Memoire of Mr. Du Quesnay, 10th Observation.

removed

removed, and a hernia cerebri was afterwards produced, which was repeatedly pared down with the knife. On the thirty-fifth day from the accident, the patient having intoxicated himself, while in this state, slipped his hand under the dressings, and laying hold of the protruding coagulum, tore it away with violence. The next day the surgeon found, that almost the whole of what he considered as corrupted brain, was removed, and a vacancy left, so deep, that he could see nearly to the corpus callosum. From this time forward the parts went on healing, until they got quite well; but the patient continued to labour under a paralysis of the left side, which had supervened the day after he received the blow.

It is obvious, from the nature of the substance of which the tumour is composed, that styptic remedies applied to its surface can have scarcely any effect in lessening its bulk, and none at all in putting a stop to its growth; and experience shews, that the more active of them are not only ineffectual, but highly dangerous. Hildanus, in his Fourteenth

Obs. relates the case of a man who died in consequence of an empiric having dressed a tumour of this kind with alum and calcined vitriol. And Mr. Hill tell us (p. 198), that, after shaving off the protruding part, he once sprinkled the basis with some blue vitriol, and another time with red precipitate; but found that "his patient had a very bad day after each of these;" no doubt, in consequence of their being dissolved by the discharge, and insinuating themselves between the tumour and the edges of the skull, so as to get into contact with the sensible parts within; for, that it was not owing to their effect upon the tumour, is evident from its indolence when he had removed it with the knife*.

* The foregoing cases explain a particular kind of protrusion, which seems to me to have been frequently described by authors, and of which they serve as specimens. Such occurrences cannot be observed without surprize; the suddenness of the protrusion scarcely admits the supposition of the protruded part being organized. It was never meant by the recital of these cases to deny, that the surface of the brain, when exposed and irritated would throw out a vascular fungus; it was only intended to describe a species of those appearances which had been
denominated

SECTION IV.

Concussion of the Brain.

As I am of opinion that the effects of concussion have not been justly described by authors, and as the symptoms related by them are not, according to my experience, those which usually occur, I have therefore selected two cases out of a great number that I have seen, in order to shew what have ap-

denominated fungus or hernia cerebri. In all the cases of true fungus cerebri which I had seen when I first wrote the foregoing account, the fungus grew so slowly that it could not be mistaken or confounded with the appearances which took place in the cases I have cited. Since that period, I have seen cases in which the fungus grew much more rapidly, yet none in that degree which would make it liable to be confounded with the appearances described in the present section. The curative indications in the true fungus cerebri seem to be, to diminish those causes which occasion the brain to be thrust upwards against the bone, and to apply gentle pressure from without, so as to give that degree of support which the part ought naturally to receive from the dura mater and bone.

peared to me the common consequences of this injury ; and I shall afterwards offer some remarks respecting the treatment of this affection.

CASE XVII.

Harriet Silverthorn, aged twenty-three years, slipped down stairs, and struck her occiput against some of the lower steps, by which the integuments were divided about half an inch in length, but the wound was not deep, nor were the surrounding parts much bruised. She was taken up senseless, was bled, and the next morning conveyed to St. Bartholomew's Hospital. When brought in, she was comatose ; could not be made to answer any questions ; yet she drew back her arm when pinched, and seemed very uneasy when the wounded parts were pressed upon. Her breathing was without stertor, but performed at some interval, as if she did not wish to inspire until obliged by necessity. The pulse, which was full and labouring, intermitted every fourth or fifth stroke.—Eight ounces of blood were immediately taken away, and an opening medicine given, which
procured

procured three stools, after which she was ordered a mixture, containing aqua ammoniæ acetatæ, and antimonial wine. — The next day (*Friday*), she was rational, put out her tongue when desired, and said she had no pain in her head; her breathing was more regular, and her pulse free from intermission. (*Saturday*,) she was still more sensible, and gave some account of herself; complaining now of head-ach, and general uneasiness. The mixture was continued, the purging medicine given again, and a blister laid on between her shoulders. — (*Sunday*,) her pulse was harder; she was sensible, but restless; complained of pain in her forehead, sat up in bed, and wanted to go home. Six or eight ounces of blood were taken from her temples, and the mixture ordered to be continued as before. — (*Monday*,) she was much more composed; but as she had still some pain in her head, a blister was applied to it. — (*Tuesday*,) she had slept quietly during the night, answered rationally, but with quickness, and eagerly desired to go home. As the blisters appeared to have been serviceable, that on her neck was renewed. — (*Wednesday*,) she

was perfectly quiet, and in every respect better; nor had she, after this, any complaint worth mentioning.

CASE XVIII.

A Frenchman, twenty-seven years of age, who had been many years in England, and (as it afterwards appeared) spoke our language perfectly, had met with some accident (but in what manner, I know not), in consequence of which he was brought to the hospital. He was then very comatose, and expressed much uneasiness at being roused from that state; yet he put out his tongue when bid, but did not give a rational answer to questions put to him, and his replies were made in his native language. His pulse was regular, strong, and about 96 in a minute. Ten ounces of blood were taken from his arm; and after being purged, the common saline mixture, with antimonial powder, was ordered to be given. In the night he grew delirious, got out of bed, and tore the bandage from his arm; in consequence of which he lost a good deal of blood before it was perceived. This, however, seemed of use
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to him ; for he became more tranquil after it, and lay quietly dozing till morning. Next day, he was more rational, and complained of pain in his head. When I told him that if he kept quiet, he would soon be well, he said, he hoped so ; and appeared solicitous to know what should be done to him. His pulse was only 80, and not strong. A gentle laxative was given, and a blister applied to his head. — On the third day, he was much more sensible, spoke with clearness, and mentioned the pain being in the fore-part of his head ; yet, when I asked his age, he told me he was but sixteen years old. — *Tuesday* (fourth day), he appeared more excited and wild ; his tongue was dry, but his pulse only 75. Nine ounces of blood were taken from the temporal artery. — Fifth day, his pulse was only 70, and perfectly natural ; yet he had pulled off the dressing from his blisters, and seemed to be very irritable. — Sixth day, still pain in his forehead, pulse rather quicker, but tongue not furred. After this he gradually recovered, without any particular symptom occurring, and without any other medical treatment.

It is not likely that, in either of these cases, extravasation, at least to any considerable degree, had taken place within the head, since in neither of them was there stertor, dilatation of the pupils, or insensibility. They may, therefore, I think, be considered as exhibiting the symptoms which attend simple concussion. The foregoing cases were indeed instances of but slight concussion to what the brain sometimes suffers, and which proves fatal. To display the symptoms which occur in the worst cases, I relate the following instance.

CASE XIX.

W. Thomas, about thirty years of age, fell from the top of a brew-house, a height of at least 80 feet. His hand being stretched out, first sustained the shock, by which the carpal bones were separated, and driven upwards, some before, and others behind the ends of the radius and ulna, the articular surfaces and periosteum being at the same time forced off the latter bones. I mention these particulars to shew the great violence of the fall. The man's head afterwards struck the ground,
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as appeared by a bruise on his face ; but the cranium was not injured. When brought to the hospital, he appeared almost deprived of life, his body being cold, and his pulse scarcely to be felt. The gentlemen then attending, put his feet into warm water, and gave him an opiate.

After this he gradually became warmer, and it was observed that there was not much dilatation of the pupils, and but little stertor in respiration. I saw the patient next morning, at which time his skin was very hot, and he perspired copiously. His breathing was repeated at regular intervals, but the expirations were made with unusual force. The pulse was extremely irregular, both in frequency and in strength ; generally about 140 in a minute. His pupils were moderately contracted, his eye-brows drawn into a frown as if he suffered pain. When I spoke to him softly, he did not answer. I pinched his hand slightly, but he did not move ; but when I repeated this a little harder, he drew it away with seeming vexation. He disliked that his eyes should be examined. When by
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speaking loud, I roused him, and inquired if his head ached, he answered, Yes. I got him to swallow some opening medicine, which emptied his bowels; and four leeches were applied to his temples; but they extracted very little blood, and I thought his pulse countermanded any further evacuations.

In the afternoon, he appeared better. His pulse was more regular, and his skin of a more natural temperature; his pupils, however, were more contracted, and his sensibility increased. I tried the effect of giving him forty drops of tinct. opii, thinking it might diminish sensibility, and keep him quiet for some time, during which the vascular system (which seemed to be particularly deranged) might perhaps regain its powers. The opiate increased his disposition to sleep, and he appeared to suffer less pain; but in the evening, his pulse was more feeble and frequent, and his skin hotter, and quite wet with perspiration. Wine was now given to him, but without any apparent benefit; the powers and actions of life gradually diminished, and before morning he died.

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On dissection, there appeared every mark denoting violent inflammation of the brain and pia mater, of short duration. The minute arteries of the pia mater were turgid with blood; in many places there was the appearance called blood-shot, which was also to be seen in the lining of the ventricles. Dark-coloured, and in some places, bloody, coagulable lymph filled all the recesses between the tunica arachnoidea and pia mater. On dividing the substance of the brain, all its vessels appeared as if injected with blood.

I am inclined to believe that the medical treatment of this patient did him neither much good nor harm. The means employed seem to have acted on him as on a person in health. The opening medicine rendered him cooler, and quieted a little the disturbed actions of the system. The opiate made him more still, and disposed him to sleep.

I leave it to practitioners to consider, whether cordials would have been of any service in this case. Would they not rather, by stimulating the nervous system, have increased the

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the disturbance of the sensorium, and, by exciting the heart and arteries, have tended to aggravate the inflammation of the brain.

I add another case, because it is remarkable for the violence of the subsequent inflammatory symptoms. The case was attended by Mr. Sheppard of Chew Magna, who was, at the time it happened, dressing pupil to Sir Charles Blicke at St. Bartholomew's hospital. To his judicious and unremitting attention I cannot but attribute in a great degree the ultimate welfare of the patient. The account which I have drawn up, is taken from Mr. Sheppard's notes.

CASE XX.

David Davis, a robust man, thirty-five years of age, was admitted into St. Bartholomew's hospital on the 21st of November 1799. He had fallen from a considerable height on his head, and had bruised and wounded the scalp, but without fracturing the bone. He was, when brought to the hospital, so far insensible, as not to be affected by slight impressions, and his extremities

mities were cold. His feet were put into hot water, and, after some time, he became warm and more sensible, and the pupils of his eyes contracted as in common. Twelve ounces of blood were taken from the temporal artery, and a purging medicine given. On the following day, the pulse being full and hard, sixteen ounces more of blood were taken away, and the purging medicine repeated, which procured several stools, and a blister was also applied to the nape of the neck. Notwithstanding these measures, however, he became delirious, and his skin felt hot, and he complained of pain in his head. Twelve ounces more of blood were therefore taken, and three grains of pulvis antimonialis given every fourth hour.

November 24. The delirium still continued, but the patient lay more quiet: his pulse was 120, and full, therefore twelve ounces of blood were taken, and as the delirium and strength of the pulse still continued, in the evening the bleeding was repeated to the extent of twelve ounces. His bowels were also emptied by magnesia vitriolata

olata and fenna. Afterwards he had thirty drops of Tinct. Opii given him at night. He slept some hours in the night, and next morning his pulse was less hard, and only 96 in a minute; his answers to questions were also much more rational, and delivered in a less loud and quick tone of voice than before. For during the greater part of the delirium he had been very unmanageable, rolling about in bed and endeavouring to get up, and speaking in a loud and fierce manner. Towards the evening the symptoms again increased; his pulse was 120, and harder and fuller than in the morning; his skin was hot, and he complained of thirst. He had taken purging medicine in the morning, which had operated. Three grains of antimonial powder were now given every fourth hour, and his feet put into warm water, in hopes of procuring perspiration: ten ounces of blood were taken from the temporal artery, and the opiate repeated at night.

25th. The patient had slept during great part of the night; his pulse 100; he complained of cold, though his skin was hot; and
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of great pain in his head. More stools were procured, and twelve ounces of blood were taken from the temporal artery. He now took six grains of pulv. ipecac. comp. every four hours.

26th. He had been delirious during the former part of the night, but had slept towards the morning; in other respects he was much as before. In the evening, as his pulse would bear it, twelve ounces of blood were again taken away.

27th. Pulse softer and frequent. He had three stools from medicine in the evening. The delirium seemed to have a little subsided, and he was much inclined to sleep, so that it was difficult to obtain an answer from him.

28th. A blister was applied to his head, and in the evening his pulse becoming full, ten ounces of blood were taken from him. Two grains of opium were given him at night.

29th. He had slept well but complained of his head, and of difficulty in swallowing,

and in the evening had hemiplegia of the right side of his body.

30th. He had slept but little, the bowels lax, the pulse small and frequent, the hemiplegia continues.

We had thus far been endeavouring, by the most powerful means, to subdue a violent inflammation of the brain, and could scarcely have be said to have accomplished our design, when a new affection called for attention. I think it can scarcely be doubted, that the hemiplegia was the effect of pressure made by an effusion of fluids, in consequence of inflammation, operating probably chiefly on the left hemisphere of the brain, so as to paralyze the opposite side of the body. Under this persuasion, and without expectation of success, I directed that two drachms, by measure, of strong mercurial ointment should be rubbed in on his arms and legs night and morning, and that five grains of the pil. hydrarg. with one grain of opium, should be given three times a day. These means were continued for three days without any striking

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ing amendment being perceived, but on the fourth (Dec. 4.) he stretched out his right arm when required, and he was able to swallow without difficulty. As he was getting better, the same plan was persevered in till the 9th, when the mercury had affected his mouth, and produced a diarrhœa. He now knew all those persons who attended him, and his state was surprisingly altered. During the inflammation of the brain he had been very unmanageable, and his replies and expressions were fierce and loud. Now he was extremely tractable, and wept whenever he was spoken to. His pulse was very feeble, and beat but 90 in a minute. It seems right to mention that a few days afterwards, when he was slowly recovering, one of the wounds of the temporal artery gave way, and he lost perhaps fourteen ounces of blood before it was perceived. This circumstance of course made him weaker, and increased the frequency of his pulse, but it did not much impede his recovery, which, though very slow, was very perfect. Extensive sloughing of the integuments of the nates had taken place, which it does not seem re-

quisite to mention, but inasmuch as it tends to shew the reduced state to which he had been brought. Indeed if this patient had not possessed a vigorous constitution, it seemed scarcely possible that he could have survived the debility which this disease and the treatment conjointly produced.

The extent of the evacuations, that surgeons are obliged to make in inflammations of vital organs, is such, as would deter the unexperienced from pursuing them, and must astonish those who have employed them with success, that they could be borne with so little apparent injury. It can only be accounted for by considering the disease as the stimulus which keeps up the actions of the constitution under such exhausting measures, as would occasion them to sink but for this excitement.

The opinions, that prevail amongst surgeons respecting the treatment of concussion, are very different. Many late writers advise stimulating cordials, such as wine, and volatile alkali, to be given; while others pursue a
directly

directly opposite conduct. Nor do they agree in the account of the symptoms, which they consider as depending on this species of injury. Most writers represent the subject, as if the deranged state of the brain, which is the immediate consequence of the shock, continued to the termination of the patient's illness or of life; while, in the cases given by Mr. Pott, the symptoms appear to proceed more from the inflammation which ensues, than from the concussion.

The whole train of symptoms following a concussion of the brain, may, I think, be properly divided into three stages. The *first* is that state of insensibility and derangement of the bodily powers, which immediately succeed the accident. While it lasts, the patient scarcely feels any injury that may be inflicted on him. His breathing is difficult, but in general without stertor; his pulse intermitting, and his extremities cold. But such a state cannot last long; it goes off gradually, and is succeeded by another, which I consider as the *second* stage of concussion. In this, the pulse and respiration become better,

and though not regularly performed, are sufficient to maintain life, and to diffuse warmth over the extreme parts of the body. The feeling of the patient is now so far restored, that he is sensible if his skin be pinched; but he lies stupid, and inattentive to slight external impressions. As the effects of concussion diminish, he becomes capable of replying to questions put to him in a loud tone of voice, especially when they refer to his chief suffering at the time, as pain in the head, &c.; otherwise, he answers incoherently, and as if his attention could not be excited, or was occupied by something else; he is, in short, like a man in a heavy sleep. The concussion of the brain, lastly, produces a state of inflammation of the organ, and this constitutes the *third* stage, which is the most important of the series of effects proceeding from this cause.

These several stages vary considerably in their degree and duration; but more or less of each will be found to take place in every instance where the brain has been violently shaken. . Whether they bear any certain proportion

portion to each other or not, I do not know. Indeed this will depend upon such a variety of circumstances in the constitution, the injury, and the after-treatment, that it must be difficult to determine.

With regard to the treatment of concussion, it would appear, that in the first stage very little can be done. From a loose, and, I think, a fallacious analogy between the insensibility in fainting, and that which occurs in concussion, the more powerful stimulants, such as wine, brandy, and volatile alkali, are commonly had recourse to, as soon as the patient can be made to swallow. The same reasoning which led to the employment of these remedies in the first stage, in order to recall sensibility, has given a kind of sanction to their repetition in the second, with a view to continue and increase it.

But here the practice becomes more evidently pernicious. The circumstance of the brain having so far recovered its powers, as to carry on the animal functions in a degree sufficient to maintain life, is

surely a strong argument that it will continue to do so, without the aid of such means; which tend to exhaust parts already weakened, by the violent action they induce.

It seems probable that these stimulating liquors will aggravate that inflammation which must ensue sooner or later. The access of it, in the cases which I have related, is sufficiently evident; and its cure is to be effected by the common methods. The great benefit of evacuations was, in those cases, very evident. Indeed, it appears to me, that there is no complaint which requires such means to be more rigorously prosecuted, than an inflammation of the brain or its membranes.

In addition to the reasoning which I have offered here, I would observe, that surgical books abound with cases in which suitable evacuations have been freely employed in concussion, with the best effects; while the advocates for a contrary practice have rested their arguments upon vague theory, and communicate no particulars of their success.

If the foregoing cases exhibit the genuine marks of concussion, the administration of cordial medicines, which has been so much recommended, appears to be very ill adapted to the relief of such an injury.

I have seen so many additional cases of concussion, so exactly corresponding to those formerly related, that I am more fully satisfied of the truth of the representation which has been given of them. I have in consequence been led more and more to wonder, that a contrary plan of treatment to that which has been so uniformly successful, could ever have been recommended, and to conjecture what cases could have occurred, in which such opposite practice must not have been strikingly prejudicial. Probably I may point out such cases; and as I do not find them described in books of surgery, because they have not been deemed sufficiently important, it may not be improper briefly to mention them.

A young lady was stooping in a closet, and rising up suddenly and forcibly she struck her
G 4 head

head against a shelf. The blow occasioned extreme pain, but did not stun her. She went down stairs without mentioning the accident, and after sitting with her friends for a short time she fainted. As it was in the evening she went to bed, but could not sleep for pain in her head, and the next day her pulse was very languid, and her extremities cold; she complained of great pain when the scalp was slightly touched, and said there was a sensation as if cold water was dropping on it. She took some gentle opening medicine, which relieved these symptoms, but she could not sit up for many days, and it was a considerable time before she recovered from the languor, which the blow had occasioned: but neither fever, nor failure of sensation, or of intellect, took place in the slightest degree. I have seen many similar cases, and in one the patient said his sensations were such as would induce him to believe that his brain was loose, and moving on the inside of the skull. All these cases were relieved by slight evacuations, as gently opening medicines, leeches, or cupping, though I am inclined to believe that a contrary plan
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of treatment, which has been recommended in concussion, might have been pursued without material detriment. Cases of this description are to be considered as arising from nervous symptoms, attendant upon slight injuries, rather than as effects of serious concussion. Mr. Pott, in speaking of concussion, says, that he never knew patients recover from the immediate consequences of it, without an imperfection in some sense, or part of the body, remaining. The result of my own experience has been very different; and yet I am ready to believe that such events may not unfrequently take place, as I know from examination, that the substance of the brain is sometimes lacerated and disorganized in violent concussions. I have, however, examined other cases of fatal concussions, without observing any such lesion of the substance of the brain.

It has hitherto been considered as a desirable object, to point out any marks by which we might distinguish between compression and concussion of the brain; but I believe
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no such criteria have yet been communicated to the public. If we judge of the symptoms of compression from what occurs in cases of apoplexy, or from cases like those which have been related of the rupture of the middle artery of the dura mater, (in one of which cases it was evident, that concussions had no share in producing the symptoms,) we must, I think, be of opinion, that pressure on the brain occasions insensibility partially, or generally, and in a degree proportionate to its quantity. In extreme cases, such as I have cited, the insensibility is manifested by every circumstance. The pupil of the eye is dilated, and cannot be made to contract even by a strong light. The respiration is slow and stertorous, and the pulse proportionately slow and labouring. There is no vomiting, which would indeed indicate sensibility of stomach. The limbs are relaxed, as in a person just dead. No struggles take place, nor signs of sensation appear during the operation; but on the pressure being removed, sensation and intelligence are immediately restored.

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In concussion, the insensible state is of short duration, and during its continuance the body is generally cold, and the pulse feeble and intermitting. Afterwards the skin is hotter than usual, the pulse and respiration more frequent; the former often intermits, and the latter has not the stertor of apoplexy*. The pupil of the eye is not dilated, but rather contracted. The countenance expresses pain or uneasiness; and vomiting occasionally takes place. The state of the patient is like that of a heavy and uncomfortable sleep; yet, being roused, signs, even of intelligence, appear.

In fractures of the basis of the skull, however, it must be acknowledged, that the symptoms are often deceptive. In general the symptoms resemble those of concussion, yet sometimes a degree of insensibility

* But the absence of stertor must not be relied on as a proof that there is no compression; for Morgagni relates dissections of apoplectic persons, where the effusion was considerable, yet no stertor had occurred; and I have seen cases where it took place only in a very slight degree.

may be observed like that produced by pressure, when no pressure has really taken place.

I cannot better represent to the reader what I conceive of the value of the distinctions which I have made, between the symptoms of compression and concussion of the brain, in ordinary cases, than by relating briefly some of the particulars of a case sent me by Mr. Davies, surgeon of Tetbury, who was formerly an industrious and intelligent student at St. Bartholomew's hospital. The case also, in my opinion, deserves to be recorded for other reasons, which I shall afterwards mention.

A young woman was knocked down by a blow on her head, and the place where the blow had been received was denoted by a soft swelling of the scalp. She lay in a state of apoplexy, and appeared like a corpse. The pupils of her eyes could not be made to contract by the approach of a strong light; her olfactory nerves were unaffected by the most pungent odour; her ears were equally insensible to sound; she manifested no uneasiness
upon

upon being sharply pinched; her pulse was small and intermitting, and her breathing scarcely perceptible; and a cold and clammy moisture covered her skin.

Mr. Davies immediately divided the scalp, and finding the bone fractured, he trephined it. There was no blood upon the dura mater, but that membrane was thrust up into the aperture made by the trephine. The dura mater being divided, about five ounces of blood was suddenly discharged, and the patient rose up in bed, as if waking with affright. Her pulse and respiration were soon relieved, and became natural. A plan of treatment calculated to prevent and subdue inflammation was strictly pursued, and the patient did well without any remarkable occurrence taking place.

From what has been already said it may be inferred, that I do not consider the division of the dura mater as a slight evil. It is, doubtless, the duty of a surgeon, when he has been urged to trephine, on account of strong symptoms of pressure, to divide that membrane, if it be thrust upwards into the

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aperture

aperture which he has made. I have said that frequently the blood is coagulated, or so thickly grumous, that the whole of it cannot be discharged. In the present case, however, the promptitude of the surgeon's conduct enabled him happily to discharge the effused blood whilst it remained fluid.

SECTION V.

Inflammation of the Pia Mater *.

THE inflammation of the dura mater, which occasionally succeeds to injuries of the head, has been well described by Mr. Pott. Patients labouring under this complaint are feverish, have a constrictive pain in the head, but continue rational, and give a clear account of their symptoms, until matter forms, or inflammation of the internal parts ensues. This is what we might naturally expect from the structure of the dura mater, the manner in which it is supplied with blood, and its vessels having little connection with the brain. When the pia mater becomes in-

* In the former edition, I related in this section cases of inflammation of the pia mater, in which this disease occurred distinctly, and terminated fatally, in order to authenticate the specific symptoms attendant on it. As many of the foregoing cases, however, are instances of this disease coming on after concussion or fracture, and yet occurring as a distinct disease, and uncombined with symptoms arising from the peculiar nature of the injury, I think a further narrative of cases superfluous.

flamed,

flamed, as the brain derives a considerable portion of its blood through the vessels of that membrane, the disease is instantly communicated to the cerebrum, and deranges its functions. This derangement varies in its nature and degree, accordingly as the inflammation of the pia mater is more or less violent; as it is confined to the surface, or extends to the internal parts; as it produces a greater or smaller secretion of fluid which compresses the brain; or as it is more or less blended with the effects of concussion. The state of the patient will vary considerably under these different circumstances. If the inflammation be violent and general, the patient will be irrational and disturbed, having his mind strongly affected by wrong ideas, and endeavouring to act in consequence of them. If the inflammation be moderate, and affect the surface only, he will be irrational, uneasy, restless, and perhaps endeavour to get out of bed, but without the violence of mania. Should a moderate inflammation be blended with the effects of concussion, he will have less appearance of irrationality, will lie pretty quiet, and inattentive to slight impressions, as
appeared

appeared in some of the cases related.—I am not able to particularize every variety that may occur in the symptoms; but in all, there must be more or less derangement of the powers, both mental and corporeal, depending upon the degree of inflammation, &c.* — The symptoms, which chiefly characterize the complaint, are those of an increase of sensibility; the pupils of the eyes are contracted; the patient often withdraws his arm on being touched, and his pulse and tongue denote general as well as local inflammation. It seems of the utmost importance, that those means which in general cure inflammation, should be prosecuted very vigorously at the commencement of this complaint; since otherwise, although they may check, they will not overcome it. Large blood-lettings, brisk purging, and extensive counter-irritation by blisters, ought to be

* An unusual infirmity of the bodily powers is sometimes observed, accompanied with tremors, low delirium, and exceedingly rapid pulse; yet, on dissection, a slight inflammatory appearance of the pia mater and brain is all that can be discovered. Such a state sometimes occurs after an abscess has formed in the brain.

employed at the very commencement; for, if omitted, the disease will then become established, and the powers of the body will soon be too much sunk to admit of the same active treatment at a later period.

I have here represented the general effects of inflammation of the pia mater when it arises from external violence. In other cases, indeed, where it comes on, as it were, spontaneously, or without any powerfully exciting cause (in which case it generally falls under the care of the physician), it has appeared to have affected the brain but little, and to have been very slow in its progress, and inactive in its nature. In such cases it has produced a deposition between the tunica arachnoidea and the pia mater, or a collection of serum between the former membrane and the dura mater. Under these circumstances, I have learned that the rationality of the patient has been scarcely deranged. And as such a state of disease may occur after an accident, I have thought it right to mention it in this place.

In the generality of cases of injury done to the head, the symptoms of concussion, compression, and inflammation are so combined as to appear inexplicable. It is only by an attention to those rare cases, in which the symptoms of each appear distinctly, that we are likely to increase our knowledge of their specific effects. I conclude this review of the effect of injuries done to the head, by observing, that whatever may be the nature of the injury which the brain may have sustained, still the disorder induced in that organ must produce a proportionate disorder in the functions of the digestive organs, and the reaction of the latter affection must aggravate the former. Some remarks on this subject are inserted in the first volume of these observations. To corroborate further the statement there given, and to bring this subject before the reader's mind on the present occasion, I relate the following case, which occurred about two years ago.

CASE XXI.

A young gentleman received a severe wound on the forehead, which laid bare the
bone,

bone, and stunned him. By venæsection and the usual treatment, the immediate ill consequences of the injury were mitigated and subdued; so that the wound healed, and he was considered to be convalescent. He was not, however, well; he had strange nervous feelings about his head; and after three months he became very much disordered. Calling at a friend's house, he discoursed wildly, and became so delirious, that they were obliged to confine him in bed by means of a strait waistcoat. Ten ounces of blood were taken from him, and I was desired to visit him. His pulse beat more than 100 in a minute; his skin was hot and dry; his tongue was furred, but it could not be distinctly seen; he shewed no signs of understanding to any questions that were put to him; he rolled his head about; and breathed altogether by means of the ribs, without moving the diaphragm. When I pressed even slightly beneath the ensiform cartilage, he seemed to suffer greatly, and became slightly convulsed. The blood which had been taken from the arm did not indicate inflammation, and I was therefore induced to consider the symptoms

toms as arising from nervous irritation, caused, or aggravated, by disorder of the digestive organs. As it was impossible to get the patient to swallow, we formed two grains of calomel and 10 of jalap into an electuary, by means of a little honey, and besmeared the back part of the tongue with it. The same medicine was repeated after six hours. The second dose produced two copious discharges from the bowels, after which his head was so much relieved, that when I called on him the following morning, he was perfectly rational, and his pulse was tranquil. I then questioned him particularly respecting the kind of pain in his head; and, he told me, that it was not severe, nor accompanied with throbbing; that it was confined to the part which had been wounded, and it was constant. As the purgative medicines had not begun to operate till towards the morning, I thought that their effects might continue, and therefore only advised, that he should take saline draughts in a state of effervescence, during the day; and food of an unstimulating quality. No more

evacuations however took place from the bowels, and in the afternoon the patient again became delirious, so that when I saw him in the evening he did not seem to understand any thing that was said to him. He lay, however, much more quietly than he had done on the preceding evening, only occasionally moving his head to one side or the other, and then seeming as if he was looking for some object by the side of the bed. The jalap was now again given him, with the addition of one grain of calomel. The medicine operated twice in the night, and next morning he was again perfectly rational. We now insured the continuance of discharges from the bowels, by directing him to take some common purging mixtures, if his bowels did not act in six hours. The delirium did not return, and the patient soon became as well as he had ever been since the accident. Yet still his digestive organs were not in a healthy state. His tongue was much furred; his bowels either costive or purged, and generally in the latter state; and the secretion of bile was either deficient in quantity, or faulty in

in quality. He remained in this way for many months, though various kinds of medicines were given for his relief. At last a spontaneous diarrhœa occurred, and as I was informed by his physician, his bowels afterwards regained their natural tranquillity and functions.

SECTION VI.

Cases of Disease of the Bone and Dura Mater.

THE diseases of the cranium, and consequent affections of the dura mater, have been well described by some French and German surgeons*. But as they have not, I believe, been explained by English writers, I shall confirm the accounts which we have received of them by additional cases; and afterwards shall offer some remarks on this subject.

CASE XXII.

A man, between thirty and forty years of age, was salivated for complaints in his head, supposed to be venereal. There were two tumours of the scalp; one a little before the coronal suture, and the other a little above the posterior superior angle of the left parietal bone. The man's health was greatly reduced by the course of medicine he had undergone,

* Vide Mons. Louis' Memoire, in the fifth volume of the Mem. de l'Acad. de Chirurgie, and Haller's Disputationes Chirurgicæ.

as well as by the disease, which had considerably increased during the use of mercury. The integuments covering the posterior tumour had ulcerated; and a probe could be passed under them, so as to discover a considerable extent of bare and carious bone. The surgeon, under whose care he was admitted into the hospital, divided the integuments, and perforated the diseased bone, which was found separated from the dura mater. That membrane also had a very morbid appearance, being covered with a soft substance of a dirty reddish colour. On pressing down the dura mater with a probe, to see if it was detached to any extent, nearly a table-spoonful of healthy pus issued from beneath the bone, about an inch behind the part perforated. The surgeon thought this might be sufficient to relieve, and therefore deferred making another perforation. But the man, who had lain stupid, though not irrational, and had *subfultus tendinum* accompanied with great debility, grew shortly after delirious; in which state he continued about two days, when he became convulsed, and died.

On dissection, purulent matter was found on the dura mater, beneath both the carious portions of bone. The membrane also, which was detached, was much thickened, so as in some degree to indent the surface of the brain. The pia mater was generally inflamed; and a larger quantity of fluid than usual was found in the ventricles.

CASE XXIII.

An old man was admitted into the hospital for a complaint of giddiness and pain in his head. Upon examination, a tumour was perceived over the left parietal bone, into which an incision was made, and a good deal of matter discharged. The pericranium was found to be detached for three inches in length, and two in breadth. In the middle of the bare bone, which seemed to be dead, and really was so, granulations of a healthy appearance had sprouted out. These arose from the dura mater, and had made their way through the bone. The patient's health, which was moderately good at the time of his admission into the hospital, gradually declined; and, after about six weeks, the pain
in

in his head became particularly severe. From this time he became gradually comatose, took no food, and soon died.

On dissection, the dura mater, beneath the carious bone, was found detached, and had granulated. Much pus lay between the left hemisphere of the brain and the falx; and the whole of the dura mater covering the right hemisphere was lined with healthy pus, which adhered to its surface, and appeared to have been secreted by that membrane.

The cases of diseased bone, which require perforation of the cranium, have not been sufficiently treated of by any English writer. Mr. Pott has, indeed, noticed the disease and death of portions of the skull, that succeed to contusions; but he has not sufficiently explained the affections of the membranes of the brain, which even these diseases sometimes occasion. The circumstance, which seems particularly to have attracted his attention, is the inflammation and suppuration in the diploë, which proceed from injury done

done to the bone. The existence of that complaint, however, is easily known; for while there is a fixed pain in that part of the bone, there is no general inflammation, or but very little, of the dura mater. The disease continues, too, a much longer time without producing any seriously bad symptoms, than any disorder of the internal parts could do. When matter is formed in the diploë, the pericranium will certainly separate from the bone, and the external table of the skull will undoubtedly perish. In a case so clearly marked, the conduct to be pursued is obvious, which is, to remove a portion of the external table with the trephine, so as to discharge the matter collected in the diploë, without which no relief can be obtained. I have seen, in several cases where the operation was performed early, that the external table came away within the circle of the trephine, the matter was discharged from the medullary part of the bone, and the internal table remained sound and entire, covering the dura mater. Granulations soon arose, and the patients got well, with the exfoliation only of a portion of the
outer

outer table. The mischievous consequences of delaying the operation, when once the disease is known, must be evident; for the matter collected within the bone, having no natural outlet, will press on every side, first gradually destroying the diploë, sometimes extending itself over almost the whole of the cranium, and at last occasioning the partial absorption of both tables, so that the skull after death shall be found perforated with a number of holes, like a piece of worm-eaten wood. These holes afford a discharge to the matter, which not only oozes out beneath the pericranium, but also insinuates itself between the skull and dura mater; till at length the patient sinks, worn out by the irritation and fever which this painful and extensive disease creates; unless, as it sometimes happens, he is previously destroyed by inflammation attacking the membranes of the brain.

Suppuration of the diploë, and the death of a portion of the bone, are the common effects of injury done to the cranium; and such a morbid state may indeed occur at some distance

distance of time from the receipt of the injury. But the disease, which the cases represent, generally arises without an obvious cause. An affection of the dura mater is almost the necessary consequence of such a disease in the bone. In syphilis it probably takes place later than in any other instance; for that disorder attacks the outside of the skull, which it gradually destroys; the inner table and the dura mater remain sound till the last. But when, as in the complaint I am now considering, the whole bone is involved in disease, we can no more expect that the dura mater should remain unaffected within, than that the pericranium should continue sound and attached without; for that membrane may be regarded as the periosteum to the internal table of the skull. It is well known that, in general, the dura mater separates, and becomes thickened from a deposition and subsequent organization of coagulable lymph between its layers. This thickening is sometimes considerable, so as to form a tumour which causes an indentation in the cerebrum; as happened in a very remarkable degree in the case of the *Sieur le Gallois*,

related by M. Louis*. Sometimes the dura mater secretes pus, which being confined within the cranium, produces inflammation of the brain, &c. At others, granulations arise from the irritated membrane, and, making their way through the bone, form those tumours so well described in the *Memoir* just referred to. This took place in one of the cases I have related; and is a remarkable instance of the power which granulations possess of removing bone. The disease, however, does not confine itself to the part first attacked; for if the irritated state of the dura mater be not appeased, thickenings will take place in other parts of that membrane; or the inflammation becoming more extended, suppuration may be produced even over the opposite hemisphere of the brain, as happened in both the cases which I have related.

I do not mean to say, that in every case of diseased cranium, even where both tables of the skull are equally affected, the perforation

* See *Mem. de l'Acad. de Chirurg.* tom. v. It also took place more slightly in one of the cases which I have related.

of the bone is indispensably required. I know it often happens that the bone exfoliates, without any bad effects having been produced.

But surely no surgeon, who perceives the danger of delay, would hesitate to remove all the dead portion of bone, if symptoms denoting general irritation of the dura mater take place. The best event that can be expected, is, that the bone will at length exfoliate without much pain to the patient, or injury to his constitution. By removing the dead bone, and giving an early and free discharge to any matter collected beneath it, the irritation which it occasioned will be taken away, the diseased state of the dura mater will gradually subside, and healthy granulations arise from its surface; nor will any further disease occur in other parts of that membrane. M. Louis tells us, at the conclusion of the Memoir already quoted, in what manner experience had taught him to treat fungi of the dura mater. He says that “the whole of the tumour should be exposed, which cannot happen till the bony circle
which

“ which conceals its basis, is removed ; and
“ that afterwards means should be employed
“ to destroy the fleshy excrescence *.” Although the destruction of the fungus might be proper for the sake of expedition, and although it can perhaps be attended with no harm, by whatever means effected ; yet it may not be necessary. Like other animal fungi, it will probably cease to grow, and soon disappear, when the irritation which occasioned it has been removed.

In cases of tumours rising from within the skull, it is of consequence to determine from what part they proceed. In general, they will be found to spring from the dura mater, and to be the effect of disease in that membrane, induced and kept up by irritation. Surgeons have endeavoured either to reduce them by caustic ; to restrain them by pres-

* The excellent effects of such bold but judicious practice are well shewn in a case related in the 9th Paper of Haller's *Disputationes Chirurgicæ*, vol. i. in which a piece of diseased bone, six inches and a half in circumference, was removed.

sure; or to take them off by a ligature or the knife: and the excrescences have either ceased or continued to grow, according as the irritation which gave rise to them has been removed or not. If the former happened, the surgeon has sometimes attributed undeserved merit to the means he had employed for the cure.

Those tumours which come from within the dura mater, may possibly differ in their kind in different diseases; and of these I have spoken in a former part of this Essay.

What I have written must appear very defective, if it be considered as regarding the effects of injuries of the head in general. But my intention has been only to endeavour to illustrate particular points of practice, by a relation of cases selected from a considerable number of each kind.

I shall next relate a case, in which, though the brain was not the immediate subject of the injury, yet it became affected in consequence

quence of it, and I think the case deserves to be recorded, not only on account of several useful facts and hints relative to practice which it affords, but also because it may eventually tend to throw light on the economy and diseases of the brain.

CASE XXIV.

A man was gored in the neck by a cow. The horn entered by the left side of the cricoid cartilage, and penetrated as far as the vertebræ; it then passed upwards on the bodies of those bones, nearly as high as the bottom of the skull; afterwards it came out behind the angle of the jaw, exposing, and in some degree injuring the parotid gland in its passage, and lacerating the skin of the face as high as the middle of the ear. In its course it had passed beneath, and torn the internal carotid artery, and all the primary branches in front of the external carotid artery. The former vessel was not, however, entirely rent asunder, so that the general course of the artery, and its connection with the cranium remained in the usual state. Notwithstanding the size of the vessels which had

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been

been torn, they did not immediately bleed; the wound was therefore closed and bound up. The blood was soon observed to flow in streams down the neck, nor could any general pressure upon the wound prevent hemorrhage. In this state the man was conveyed to St. Bartholomew's hospital, but he had lost a large quantity of blood before his arrival.

The patient was laid upon a bed, and before the wound was opened, one of the students firmly compressed the trunk of the carotid artery against the lower cervical vertebræ. We found upon the first inspection of the wound, that this pressure prevented any hemorrhage; yet upon the occasional motions of the patient, and upon accidental variations in the pressure made on the vessel, the blood gushed from the bottom of the wound so suddenly, and in such quantities, as to prevent any accurate examination. The man was very unquiet; he complained much of the pressure, and was greatly distressed by a sensation of suffocation, which compelled him constantly to attempt to expectorate. Under these

these circumstances our first endeavours were to tie the more superficial arteries; but the edges of the wound being lacerated, the first ligatures which we endeavoured to make tore away portions of the flesh, and did not secure the vessels.

The situation of the patient became every moment more desperate, he really seemed choking, his extremities became cold, and his pulse was scarcely to be felt: his struggles also, which could not be controlled, made the pressure on the trunk of the artery very precarious. It was deemed necessary to enlarge the wound to get at the trunk of the carotid artery, and an incision was made between that vessel and the trachea, in a direction parallel to each of these parts. I had now the power of passing my finger beneath the trunk of the carotid artery; and of effectually compressing it between that finger and my thumb, which was placed opposite to it, upon the integuments of the neck.

I had now leisure to examine the wound with my other hand, and felt that the pharynx

had been separated from the vertebræ of the neck, and had fallen against the larynx: the irritation of the latter organ was probably the cause of the sensation of suffocation which the patient suffered. There did not appear any reason to believe that the pharynx was wounded; for though the patient was constantly spitting, the mucus was not mixed with blood. Finding that the moment I remitted the pressure of the carotid, the blood gushed out from so many orifices, and in such a torrent from the bottom of the wound, I resolved to pass a ligature round the trunk of the carotid at the part where I had been compressing it, and which was about an inch below its division. This ligature I thought might be made to serve as the tourniquet in amputation, for I could with it compress the artery so as to prevent the wounded parts becoming obscured by blood, and by slackening it I might gain information with regard to the situation of the ruptured vessels.

Should it become necessary at any time to tie the carotid artery, I am convinced that it may be done without much difficulty or danger,

ger, even without an accurate dissection of the part. If the incision be made on that side of the artery which is next the trachea, where no important parts can be injured, as was done in the present instance, the finger can then be passed behind the artery so as to compress it. The vessel being sufficiently bulky and firm, to make its form and outline distinctly perceptible, a needle may then be passed behind the artery, as near as possible to that edge of it which is next to the internal jugular vein: there can be little risk of wounding that vessel, or of including in the ligature the 8th pair of nerves which lies between them. In attempting to secure the carotid artery, I passed behind it in the manner described, a blunt hook with an eye in the point, and having previously introduced a ligature into it, I drew back the instrument and thus enclosed the artery.

When I compressed the vessel by tightening the knot of the ligature, I did it slowly, and with a watchful attention to the sufferings of the patient; for I cannot but suppose that had the nerve of the 8th pair been in-

cluded, his complaints would have sufficiently denoted that circumstance. But the compression of the ligature did not seem to make the least difference in the general state of the patient, whilst it completely prevented the further effusion of blood. With a knife and dissecting forceps I then exposed the lacerated vessels, and found that the primary branches of the external carotid artery had been torn off from the trunk. By drawing upwards the ligature which encircled the trunk of the artery, I made the internal carotid tense, so that its course and ruptured state could be distinctly felt. The ligature on the trunk was slackened, and the gush of blood further confirmed the laceration of the internal carotid artery. I had now the alternative of securing the ligature, which I had already made on the trunk of the vessel, or of tying the branches separately. I preferred the former, and it should be observed, that the man had now lain ten minutes or more, without any blood being carried to the brain by the left carotid; and during that period he had recovered from his extreme faintness, appeared perfectly sensible, and as well as could

be expected, considering that the person had lost so large a quantity of blood. The ligature being now made secure, the wound was brought together by stripes of plaister; and in this state warm milk was given to the patient to drink, in order to learn what would be the effect of his efforts to swallow, and to ascertain as far as possible, whether there was any wound in the pharynx or œsophagus. The patient swallowed about a quarter of a pint of this fluid with difficulty, and with the frequent excitement of coughing. No milk however came through the wound, and I concluded that all the difficulty of deglutition arose from the unnatural state in which the muscles of the pharynx were placed, in consequence of their detachment from the vertebræ. These circumstances happened between 4 and 5 o'clock in the afternoon, and when I saw the patient again between 9 and 10, his state seemed greatly amended. He had several times taken warm milk, and the difficulty of deglutition had abated. His pulse was now moderately full and strong, and not very frequent. It therefore appeared, that the apparently dying state of the man,

which

which at one time had alarmed us, proceeded rather from the sudden discharge of blood, than from the quantity, however considerable, which had been lost. The patient also appeared tranquil, and perfectly rational, and though prevented from speaking much, he expressed himself satisfied in this situation.

On the whole I was led to form a favourable expectation of the progress of the case, as far as related to the effects which a ligature on one carotid would have on the economy of the brain. I was next morning mortified to learn, that the patient had been unquiet and feverish during the night, that he had become delirious, that he had been several times affected by slight convulsions, which had increased; and that when liquids were now given to him, they passed through the wound, and he could scarcely swallow any thing. The pulse of the patient was now about 130 in a minute, and hard, and his skin was hot. He lay inattentive to external objects, but probably not insensible, for the pupils of his eyes were contracted, and when the lids were opened in order to examine them,

them, he shut them quickly, and as it were, impatiently. It had been remarked, that the left side of the body was more convulsed than the right.

As we had it not in our power easily to give medicine, I introduced a small hollow bougie through the right nostril into the œsophagus, and immediately injected half a pint of milk and water, and 60 drops of tincture of opium; that I might learn the effects of that medicine under the present circumstances. The patient shortly after broke out into a most profuse sweat, and the convulsions were quieted by the opium. The convulsions, when thus mitigated by opium, might be described as violent tremors of the left side of his body, but the right side remained motionless; to which curious fact I particularly attended. I placed his right arm across his breast, from which situation it did not afterwards stir. I could not, however, perceive any distortion of the face to the opposite side, and the pupils of both eyes were equally contracted. When I saw the
sweat

sweat break out on the taking of opium, and the nervous irritation diminish by its operation, I was then more forcibly struck than I had been before with the similarity of this patient's situation, to that of a person suffering from the effects of concussion of the brain, some time after the accident, when the inflammation often succeeding to it had begun to take place.

I even questioned if it might not be right to take blood from the temporal artery, which was seen beating violently. I thought, however, the general opinion would be against such practice, and I only applied a blister to the head. Twenty drops of tincture of opium were directed to be given to the patient every third or fourth hour, with a view to mitigate the convulsions, which it appeared to do. Milk and water was also occasionally given, in proportion to the degree of perspiration. No remarkable change of symptoms took place, but the strength of the pulse gradually declined, and at 10 o'clock at night he had a severe convulsion fit, and
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immediately after died. His death happened about thirty hours after the ligature had been made on the carotid artery.

The body was examined on the following day. The brain appeared to have suffered a considerable degree of inflammation. The vessels of the pia mater appeared as if they were injected, and in many places upon the surface of the convolutions of the cerebrum, there even seemed an effusion of blood producing that appearance usually termed blood-shot. There was a very considerable deposition of gelatinous substance between the tunica arachnoidea, and the pia mater. The vessels passing through the substance of the brain, though fuller than common, were not particularly turgid. A considerable quantity of water of a light brown colour, and slightly turbid appearance, was found in the ventricles, whilst the firmness of the sides of those cavities sufficiently indicated that the collection had not preceded the accident. On examining the neck, the carotid artery was found to be the only part included in the ligature. The superior thyroideal, lingual

gual and facial branches of the external carotid, were torn off from the trunk, and the internal carotid was rent across, as has been already mentioned.

Neither the trunk of the 8th pair of nerves, nor the great sympathetic, nor those of the tongue, appeared to have suffered injury. The superior laryngeal, and the descending branch of the 9th pair, were the chief nerves injured by the accident. These circumstances are mentioned to enable the reader to form his own judgment on the probability of the symptoms which occurred being produced by nervous injury or irritation.

That the disorder and death of this man are not to be attributed to the quantity of blood which he had lost, appears clearly to me, not only from the degree of plenitude and power of the vascular system which remained, but because I had seen many patients in the hospital, who had divided most of the primary branches of the external carotid artery in the attempt at suicide ; and who,

after surviving a few days, perished in consequence of the loss of blood which they had sustained, but with a train of symptoms very different from those which occurred in the present instance.

Some persons may, perhaps, be inclined to attribute inflammations of the brain to nervous injury or irritation. I have taken notice of all the injury discoverable by dissection, and have further to observe, that we frequently see larger nerves lacerated in wounds without the production of such symptoms, and the tranquil state of the patient, till the inflammation of the brain came on, opposes such an idea. Upon reflection, I can form no other opinion of the case than that which first struck me, which is, that though the stopping the supply of blood to the brain did not for several hours produce any apparent derangement in the functions of that organ, yet such a state was gradually occasioned by it; and which was attended like the effects of concussion of the brain, with inflammation. It further appeared, that when the combined effects resulting from the
derange-

“ aggravated the pulse, and gave insupport-
“ able pain. In examining it, I put my
“ thumb on the carotid of the same side,
“ and the pulse instantly ceased. Seeing
“ that it grew fast, I prevailed on the patient,
“ a women of eight-and-thirty, to allow me
“ to tie the common carotid artery, which
“ I did last May twelvemonth. She suffered
“ nothing more than I have usually seen
“ follow other operations for Aneurism, and
“ was abroad at the end of a month. The
“ tumour ceased to pulsate, but for some
“ time retained a vibratory thrill, which it
“ has since totally lost. It likewise shrunk
“ to about half its former size, and became
“ solid and incompressible, in which state
“ it has since remained. I may also add,
“ that the patient was greatly afflicted with
“ pain in the head prior to the operation, and
“ that it has completely removed that pain.”

The different states of the two sides of the body, in the case which I have last related, ought not, I think, to pass without further notice. Although the right side, could not be positively said to be paraly-

tic, yet, in my opinion, it approached to that state.

It has been already observed, that a double construction might be put upon the symptoms; yet as the inflammation of the brain was equal on both sides, we might naturally expect the whole body to suffer equally. Should the state of the right side have been, as appears most probable, an approach to a state of paralysis, it must surely be considered as peculiarly curious. An effusion of blood in the left hemisphere of the brain would affect the opposite side of the body in the same manner, that cutting off the supply of blood to the left side appears in this instance to have done. I forbear to speculate on this subject: the fact which I have mentioned seems to deserve notice, and though at present it must stand alone, it may receive future confirmation, and when thus supported, be applied to the elucidation of physiology.

I have thought it right to record this case, not merely because it is curious, but
because

because it affords some useful practical hints, as to the conduct to be pursued when a person has divided the large primary branches of the carotid artery in an attempt at suicide. It may be allowable also to mention, in relation to this latter subject, the great advantages which appear to me to arise from the immediate introduction of a small elastic catheter, passed through the right nostril, down the œsophagus, nearly as far as the stomach, (in the manner practised by Desault, in the cure of a person wounded by a pistol ball,) when the pharynx or larynx are injured.

A patient in such a state is not under the necessity of frequently swallowing nourishment, which act tears open the wounded parts, and causes inflammation in them, and produces such a secretion of mucus as excites almost constant cough, increasing the disturbance of the wounded parts.

The introduction of a small elastic catheter may be easily accomplished in the first instance, though not without difficulty, after

the sensibility of the parts has been increased by inflammation, and from the benefit I have seen derived from it I should not hesitate to do it in all cases of extensive wounds of the throat.

SURGICAL OBSERVATIONS.

ON THE ILL CONSEQUENCES SOMETIMES SUCCEEDING TO VENÆSECTION.

THE public is much indebted to Mr. Hunter for a judicious account of the appearance and effects of the inflammation of the vein, which sometimes succeeds to venæsection. The ill consequences which occasionally follow that operation are numerous and dissimilar; and they have never I believe been clearly and collectively stated and explained. The cases recorded of such complaints are dispersed in various periodical publications; and frequently, the nature of the disease appears not to have been understood by the person who relates its history. In proportion as I have seen more varieties of these diseases, my own knowlege of them has

become more clear and simple; and as I believe, I can communicate useful information, I have ventured to offer to the public the following observations and opinions. I have been also incited to this task, because the account in his System of Surgery, which Mr. Benj. Bell has given of these complaints, appears to me confused; and the practice recommended improper. I am hurt to censure the works of any author, but this either must be done, or injurious error must remain uncontradicted.

When from want of attention, or from other causes, the wound inflicted in venæsection does not speedily unite, the motions of the arm occasion attrition of its sides against each other, and inflammation of the wounded, or contiguous parts, is likely to ensue. I shall give a brief account of these different complaints, in the order in which I believe they most frequently happen.

Of Inflammation of the Integuments, and subjacent cellular Substances.

The inflammation and suppuration of the cellular substance in which the vein lies, is
the

the most frequent occurrence. Of this every surgeon must have seen repeated instances; they may also have remarked, that on the subsidence of this inflammation, the tube of the vein is free from induration: neither does the state of any of the surrounding parts indicate their previous participation in the disease. The nature of every excited inflammation will vary as the cause which produced it, and the constitution of the patient shall determine; it will therefore be unnecessary to particularly notice the varieties of its appearance. Sometimes the inflammation will be more indolent, and will produce a circumscribed and slowly suppurating tumour. Sometimes it will be more diffused, partaking more of the nature of erysipelas: and sometimes its violence, and rapid termination, will evidently distinguish it to be a phlegmon.

If the lancet with which the patient was bled should have been bad; if it lacerated rather than cut the parts through which it passed; if the constitution of the patient be irritable; and more particularly, if sufficient attention be not paid to procure the union of the divided parts, but the motion of the

arm be allowed: the irritation, which the friction of the opposite edges of the wound must occasion, will most probably excite inflammation. The treatment proper to be pursued in this complaint is manifest, and distinguished by no peculiarity; I shall therefore postpone what I have to say on that subject, until I have noticed the other varieties of these diseases.

Of Inflammation of the absorbing Vessels.

The next frequent complaint which I have seen is inflammation of the absorbents: it however sometimes accidentally happens, that one surgeon meets with many cases of a similar nature, so that were he to judge merely from his own observation, he might conclude that disease to be common, when the collected experience of others would determine it to be a rare occurrence. I am inclined to suspect, that my observation has been thus partial, since Mr. Hunter has not publicly noticed this complaint. I think I cannot give a better history of the commencement, appearances, and event of this disease, than by relating three cases, of the circum-

circumstances of which I took an account. It is right, however, to mention, that I have seen two others, of which I took no minutes; and which I am unwilling to relate only from recollection.

CASE.

A lady was bled in the vena mediana basilica; the wound did not heal, nor was sufficient attention paid to preserve the arm quiet. Eight days afterwards, I was consulted, in consequence of the patient being alarmed, by the appearance of two swellings; one was situated about the middle of the arm, over the large vessels, the other on the forearm, about the mid space between the elbow and wrist, in the integuments above the flexor muscles. The upper swelling measured rather more in circumference than an egg, the other was of smaller dimensions; they were not very painful, they were moderately firm in their texture, and so exactly resembled those tumours which form round irritated lymphatics, that no doubt could be entertained of their nature. The orifice made by the lancet was not healed, the integuments for about one-fourth

fourth of an inch furrounding it, were in a slight degree inflamed, and thickened. No induration of the venous tube could be distinguished, either at this time, or after the subsidence of inflammation.

The account which I obtained from the patient, of the attack of this complaint, was, that the wound inflamed, became painful, and discharged matter; that the gentleman by whom she was bled had dressed it with salve, but did not restrain her from using her arm; that about five days after the operation, she had felt pains shooting from the orifice, in lines, up and down her arm, and upon pressing in the course of this pain, its degree was increased. This account induced me to examine the arm attentively, and I could plainly feel two indurated absorbents, leading to the superior tumour, but could not perceive any extending to the lower one. The wounded part was dressed with mild salve; a bread and milk poultice was applied to both tumours, and the arm was supported by a sling, and retained without motion or exertion. The integuments furrounding the orifice lost their disposition
to

to inflame, and the wound gradually healed; during five days, the tumours underwent no evident alteration; the poultice was changed to one of bread, water, and a solution of acetate of lead, under which they quickly diminished and dispersed.

CASE.

A man about 35 years of age, was admitted into St. Bartholomew's Hospital, under the care of Mr. Pott: he had been bled in the country, about a fortnight before his admission; since that time he had been extremely ill, and was with difficulty conveyed to London. The state in which he was admitted, I shall describe: His whole arm was greatly swollen, the wound made by the lancet was not united, the parts immediately surrounding it did not seem to be affected by distinct inflammation; but partook of the general tumefaction. Two large abscesses had formed, one situated near the inner edge of the biceps muscle, about the middle of the arm; and the other, on the inside of the fore-arm. The patient told us that he had been bled, on account of a pain in his side; that the orifice, instead
of

of healing had festered, that he had for a time pursued his daily employment, notwithstanding the pain which he suffered; that this, however, soon became too violent to be endured; the swelling and pain extended towards the armpit, where the glands became enlarged. Inflammation next attacked the forearm, and after suffering extreme pain and fever, these abscesses had formed, and since that time his illness and pain had in some degree abated. Mr. Pott opened both abscesses, and directed his whole arm to be covered with a poultice. The patient was kept in bed, and medicines likely to alleviate inflammation were prescribed. In about four weeks, the arm was reduced nearly to its natural dimensions. The orifice, through which he was bled, had united, and the wounds by which abscesses had been opened were nearly healed. The parts surrounding them, however, still remained thickened, and also all the integuments on the inside of the arm. In these thickened integuments, three-chord-like substances, evidently absorbents, were to be distinguished; they extended from the punctured part to the superior abscess,

and again above this, two were continued even to the axilla. Two other indurated absorbents also were extended from the punctured part to the inferior abscess. The punctured vein being attentively examined, was found to be a little thickened, both above and below the orifice; it had, however, no connection with these chord-like substances, which were superficial, and their appearance, course, and every other circumstance, clearly shewed them to be indurated absorbents. The hardness of these vessels, and of the integuments had much diminished, and the patient had regained the strength of his arm, before he was discharged from the hospital.

CASE.

A poor man was bled, in one of the bleeding-shops of this city. His operator dipped some rag in the blood which he had taken, applied it to the orifice, and bound it on the arm with a tape. The patient felt much pain in the wound, even from the time of the operation, and experienced much difficulty in moving his arm. As the rag stuck closely to the orifice, he was unwilling to re-
move

move it; however, on the third day, the violence of the pain induced him to take it off: he then found the parts furrounding the puncture inflamed and hardened. The patient had also suffered much pain, which extended towards the axilla, and one of the glands there was swollen. He anointed the arm with some ointment, but the pain so increased, that he could scarcely bear it to touch his side. The integuments about the middle of the arm were elevated by a tumour, which was painful when pressed; the base of it was not circumscribed, but was gradually lost in the surrounding parts. In this situation he requested my advice. I gave him some mild salve to dress the wounded part; I directed him to keep constantly applied to the integuments, covering the inflamed lymphatics, some cloths wetted with the cold solution of acetate of lead, to keep his arm completely supported by a sling, and to take some gently purgative medicine.

This he did, the inflammation gradually subsided; and the wound made by the lancet healed.

It might be suspected, that in the cases which have been related, the lancet which was employed was envenomed; and that the absorption of virulent matter was the exciting cause of inflammation: the descent of the disease to the inferior absorbents, in the two first cases, opposes that opinion; and it is further invalidated by the observations which I shall proceed to offer. Since the structure and functions of the absorbing vessels have become so well known, the attention of medical practitioners has been directed to their diseases, and much novel information has been acquired. That which relates to the present subject, I shall endeavour briefly to state. Physiology shews to us, that the absorbents possess much sensibility. Practical observation strengthens this opinion: the celerity with which these vessels inflame, when they have imbibed noxious matter, and the pain which is suffered in consequence, sufficiently prove this circumstance. Their frequent inflammation, in consequence of disturbance of the general constitution, may be however regarded as an additional argument. A common cold pro-

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duces a painful tumefaction of the absorbent glands; and in some fevers, these parts are particularly obnoxious to disease.

There is another circumstance, which deserves attention; when the absorbents become inflamed, they quickly communicate this disease to the cellular substance, by which they are surrounded. Most surgeons have remarked these vessels when indurated, to appear like small chords, perhaps of one-eighth of an inch in diameter; this substance is surely not the slender sides of the vessel thus suddenly augmented in bulk, but an induration of the surrounding cellular substance, to which the irritated vessel has communicated inflammation. The formation of a common bubo is another instance of the power, which these vessels possess, of involving the surrounding parts in their disease; at first one or two glands are found to be inflamed, but they soon become undistinguishable, in the general inflammation of the surrounding substance. This inflammation either is dispersed, or it terminates in suppuration: and on the subsidence of the
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general tumour, the originally diseased glands again become distinguishable.

I now wish to shew, that their inflammation, in consequence of local injury, is deducible from two causes : one, the absorption of acrid matter ; and the other, the effect of irritation of the divided tube. Of the inflammation arising from the absorption of morbid matter, every one is apprized ; but that which is the effect of irritation, has been less remarked.

When virulent matter is taken up by the absorbents, it is generally conveyed to the next absorbent gland ; where, its progress being retarded, its stimulating properties induce inflammation ; and frequently no evident disease of the vessel through which it has passed can be distinguished. The absorption of syphilitic and cancerous matter affords frequent proofs of this assertion. There are, indeed, some poisons so acrid, that the vessel which admits them inflames throughout its whole extent ; yet still the glands are principally affected. When inflammation of

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the absorbents happens in consequence of irritation, that part of the vessel nearest the irritating cause generally suffers most: whilst the glands, being remotely situated, partake less of the inflammation. The inflammation is also of a different kind, and, I think, can be discriminated: when it arises from poison arrested in the part, the gland is first indurated, and a phlegmonoid inflammation follows; but if irritation be the cause of its enlargement, the tumefaction more speedily takes place, the gland is more painful in its early state, but has less tendency to suppurate; the enlargement more resembles that of the lymphatic glands of the neck, which is the consequence of taking cold.

When the inflammation arises from irritation, it will be expected, and I believe it will be found, that the continuity of the vessel will be apparent: but it does not follow, that the greatest disease will be immediately adjoining that part which has sustained the injury. The cases which have been related shew that inflammatory tumours often form in the middle of the arm and forearm,

when the wound of the absorbent is at the bend of the elbow. Were it necessary, I could relate several cases where such tumours were formed from injuries done to the fingers, or in consequence of fretting ulcers of the leg. When they arise from the latter cause, it might be supposed that some acrid matter had been imbibed; yet, I think, in that case, we should find the glands the principal seat of the disease. It has been proved, that the absorbents frequently inflame far below the part where the vessel has sustained an injury, and where the inflammation could not be occasioned by absorption. These observations I thought it right to insert, to illustrate the cases which have been related; and also to excite more general attention to the diseases of these important vessels.

Of Inflammation of the Vein.

After the account which Mr. Hunter has given of the inflammation of the vein, (in the Medical and Chirurgical Transactions) no additional information from me will be expected, nor is it perhaps required. If the wound of the vein does not unite, an inflam-

mation of that vessel will probably follow; which will vary in its degree, in its extent, and in the course which it pursues. One degree of inflammation may occasion only a slight thickening of the venous tube, and an adhesion of its sides; more violent inflammation may be attended with the formation of more limited, or more extensive abscesses; the matter of which may sometimes mix itself with the circulating fluids, and produce dangerous consequences: or it may be circumscribed by the thickening and adhesion of the surrounding parts, and then like a common abscess make its way to the surface. When the inflammation of the venous tube is extensive, it is, indeed, very probable, that much sympathetic fever will ensue; not merely from the excitement which inflammation usually produces; but also, because irritation will be continued along the membranous lining of the vein to the heart. If, however, the effect of the excited inflammation has luckily been to produce adhesion of the sides of the vein, at some little distance from the wounded part, the inflammation will here cease; its further transmission will
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by the adhesion be prevented. The effect of adhesion of membranes, in preventing the extension of inflammation along their surfaces, is frequently apparent, and has been well explained by Mr. Hunter on another occasion. In one case, Mr. Hunter applied a compress on the inflamed vein, above the wounded part, and he thought that he succeeded in producing adhesion, for the inflammation extended no further. In those cases, where the inflammation does not continue equally in both directions, but descends along the course of the vein, it is probable that its extension in the other direction is prevented by adhesion.

I have thus briefly and imperfectly transcribed Mr. Hunter's opinion, that the present Essay might not be altogether deficient in information relative to this subject. I have seen but three cases where an inflammation of the vein succeeded to venæsection; they, however, confirm the foregoing observations. The vein did not in either case evidently suppurate. In the first, about three inches of the tube inflamed both above and

below the orifice ; it was accompanied with much tumour, redness, and pain of the covering integuments, and much fever, the pulse was rapid, and the tongue furred. After the inflammation had terminated, and all tumour had subsided, the vein did not swell when compression was made above the diseased part. The second case was of a similar nature, but less in degree. In the third case, the inflammation was not continued in the course of the vein towards the heart, but extended as low as the wrist. I have no doubt, but that adhesion of the sides of the vein was the cause which prevented the extension of the disease, equally in both directions. The nature of a disease being known, the treatment is commonly evident. The diminution of inflammation in a vein is to be attempted by the same general means as in other parts. As the membranous lining of the vein is continued to the heart, and as inflammation very speedily spreads along such surfaces, unless prevented by adhesion ; the application of a compress at some distance from the punctured part, in order to unite the inflamed sides of the

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the vein, appears to be particularly judicious.

I am induced to suppose, a case may occur in which the vein may suppurate, and in which a total division of the tube may be proper practice; not merely to obviate the extension of the local disease, but to prevent the collected pus from mixing with the circulating fluids.

Inflammation of the Fascia of the Forearm.

As far as my observation has extended, the next frequent ill consequence which succeeds to venæsection performed in the arm, is an inflammation of the subjacent fascia. When this complaint occurs, it perhaps arises not merely from the contiguity of the fascia to the punctured and irritated parts, but it is probable that it was wounded by the lancet in the operation. I hope that the cases which I shall relate, and those to which I can refer the reader, will convey sufficient information of the symptoms and effects of this disease.

CASE.

A man, aged 40, was admitted into St. Bartholomew's Hospital, under the care of Mr. Pott: he had much pain and difficulty of moving his arm, in consequence of inflammation succeeding to phlebotomy. The wound inflicted in the operation was not healed; the surrounding integuments were not much inflamed, but he could neither extend his forearm nor his fingers without great pain. The integuments of the forearm were affected with a kind of erysipelas; when slightly touched, they were not very painful, but when more forcibly compressed, so as to affect the inferior parts, much pain was suffered. The patient complained of pain, extending towards the axilla, and also towards the acromion, but no tumour of the arm in either direction was perceptible. A poultice was applied to the arm, opium was given at night, and aperient medicines were occasionally prescribed. The pain in the arm increased, and it was attended by much fever. After a week had elapsed, a small and superficial collection of matter took

took place a little below the internal condyle; this being opened, but little pus was discharged, and scarcely any decrease of tumour or pain followed. About ten days afterwards, a fluctuation of matter was distinguished below the external condyle; an incision was here also made, which penetrated the fascia of the forearm. Much matter immediately gushed from the wound, the swelling greatly subsided, and the future sufferings of the patient were comparatively of little consequence. This opening was, however, inadequate to the complete discharge of the matter, which had probably been originally formed beneath the fascia in the course of the ulna; its pointing at the upper part of the arm, depended on the tenuity and comparative non-resistance of the fascia at that part. The collected pus descended to the lower part of the detached fascia, a dependent opening for its discharge became necessary, after which the patient recovered, without any circumstance being observed worth relating. The case which I have just related, and that in which two large abscesses had formed, attended with in-

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durated absorbents, occurred nearly at the same time at the hospital, and they both fell under the care of Mr. Pott. In the lectures of that eminent surgeon, I had heard dangerous and fatal consequences attributed to the injury of a nerve in venæsection, but I learned no other distinction of cases. These cases first excited my attention to this subject, and as far as I know, such discrimination as that which I now offer to the public has not been attempted.

I have seen one other case of inflamed fascia, but I neglected to take notes of the symptoms; I therefore can only say, that at the time they appeared so clearly to characterize it, that I entertain no doubt of its nature. No inflammation of the vein or absorbents appeared, the integuments were not much affected, but the patient complained that his arm felt as if bound or compressed, and that he suffered much pain if he attempted to extend it. The inflammation subsided without the formation of matter; and after much time had elapsed, the pliability of the arm was gradually regained. I the less regret
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my deficiency of experience on this subject, as I can refer the reader to the second volume of the Medical Communications; he will there meet with two cases, which I believe he will acknowledge to be inflammations of the fascia; attended, however, with some peculiarity of symptoms.

The first case is related by Mr. Colby of Dorrington, in Devonshire; the other by Mr. Watson. The inflammation of the fascia, in the latter case, was followed by a permanent contraction of the forearm. From this case, I think we have acquired useful knowledge: should a similar contraction of the forearm from a tense state of the fascia in future occur, it seems reasonable to suppose, that it may be completely relieved by detaching the fascia from the tendon of the biceps, to which it is naturally connected. This, I conclude, was the cause of the perfect restoration of free motion, in the case first related by Mr. Watson. On this subject I will not enlarge, but submit the opinion to the judgment of the reader.

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The treatment of an inflamed fascia, the consequence of venæsection, has in it no peculiarity. Doubtless, those general means which are reductive of inflammation should be employed. Of local treatment, quietude of the limb, and a state of relaxation of the inflamed part, will tend to lessen disease; but as soon as some abatement of inflammation is procured, the extension of the forearm and fingers ought to be attempted, and daily performed, to obviate that contraction which might otherwise ensue.

Of the ill Consequences succeeding to a wounded Nerve.

In order to complete, in some degree, this Essay, I have attempted to discuss the present subject; though, I acknowledge, I have no practical information to communicate. I believe these accidents to be of rare occurrence, since those of my medical friends, to whom I have applied for information, had never seen a case, the symptoms which they could decisively pronounce to arise merely from an injured nerve. Mr. Pott in his lectures used
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to say, that he had seen two cases in which the patients had suffered distracting pain, which was followed by convulsions, and other symptoms which could only be ascribed to nervous irritation. He attributed these effects to a partial division of the nerve, and recommended its total division as a probable remedy. Dr. Monro, I am informed, relates similar cases, in which such treatment has proved successful. I rely on the discrimination of these eminent men, yet I feel convinced, that the greater number of surgeons have been deficient in distinguishing these diseases. A wounded nerve, acting as a cause, must always produce specific and characteristic symptoms and effects. I need not insist on the necessity of discrimination in these complaints; those who have described the symptoms resulting from an injured nerve, have represented them as at all times imminently hazardous, and frequently fatal. An operation is here demanded; from it we have reason to expect immediate mitigation of the patient's sufferings, and his future perfect restoration. Yet this operation in any other
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of the complaints before treated of would be unnecessary, and perhaps detrimental.

I shall arrange what I have to say on this subject in the following manner: First, I shall explain what nerves are subject to injury; secondly, I shall investigate what are the effects likely to be produced by such an accident; and thirdly, I shall enquire, what means are most likely to afford relief.

First, The two cutaneous nerves are those which are exposed to injury. I dissected them in several subjects with attention, and found some irregularity in their distribution; most frequently all their branches pass beneath the veins, at the bend of the arm; but sometimes, although the principal rami still go beneath these vessels, many small filaments are detached before them, which it is impossible to avoid wounding in phlebotomy. As I believe many surgeons retain but an indistinct remembrance of these nerves, and as I have never seen them accurately depicted, in any anatomical book, I thought I should
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do an acceptable service, by giving an engraving of them. I therefore made two drawings of them: one exhibiting their most simple course; the other, their most complicated distribution. These, I conclude, are the only nerves liable to injury: it may be suspected, that the median nerve might occasionally be wounded; but its situation, I think, makes this opinion improbable. If, however, a doubt should be entertained on this subject, an attention to symptoms will soon dispel it; when a nerve is irritated at any part between its origin and termination, a sensation is felt as if some injury were done to the parts which it supplies. If, therefore, the cutaneous nerves were injured, the integuments of the forearm would seem to suffer pain; but if the median nerve was wounded, the thumb and two next fingers would be affected with pain.

By referring to the plate, it will be seen, that if the patient be bled in the vena mediana basilica, the branches of the internal cutaneous nerve are exposed to injury; or, if the vena mediana cephalica be opened, the
branches

branches of the external cutaneous nerve may be wounded.

Secondly, I wish to enquire what are the ills likely to arise from a wounded nerve. — Whoever reflects on the wonderful minuteness of the nervous fibrils, and considers their perfect distinctness from each other, although connected by a common covering of cellular substance, will scarcely imagine a partial division of a nervous fibril. If I sought to express myself strictly on this subject, I should speak of a partial division of a packet of nerves. But I shall use the commonly adopted language, and call those chords nerves, which are really composed of multitudes of separate nerves. I first beg leave to examine the opinion which has prevailed, of a nerve being partially divided. Admitting that a nerve be partially divided, would it not, like a tendon, or any other substance, unite? I think there can be no doubt but that it would: I am induced to this opinion by considering, that nerves of equal size with the cutaneous nerves of the arm are distributed in considerable numbers throughout

out the body. In the many operations performed, and in the wounds daily occurring, I think it would be strange if a partial division of a nerve should not happen, yet no peculiar symptoms are observed usually to ensue. The pain which some people suffer from bleeding, in my opinion, indicates an injury done to a nerve. If the reader refers to the plate, he will perceive, that in some cases it is impossible to avoid dividing branches of nerves in phlebotomy, as sometimes they pass before the vein. These branches are so exposed, that I should be surprised if they did not many times suffer a partial division. Surely, however, a half divided nerve would unite without causing a general derangement of the nervous system. Yet it is possible that an inflammation of the nerve may accidentally ensue, which would be aggravated, if it were kept tense, in consequence of imperfect division. In the cases related by Mr. Pott and Dr. Monro, I believe, that some days elapsed after the infliction of the injury, before any alarming derangement of the nervous system ensued. Inflammation of

the furrounding parts also appeared. These observations make it evident to me, that the disease consists in inflammation of the injured nerve, in common with the other wounded parts; and this inflammation, I can conceive, to happen with or without a total division of the nervous chord. I should consider a case of inflamed nerve as an object of great curiosity; every one, I think, will admit, that it is likely to communicate dreadful irritation to the sensorium; and every one will perceive, that a cure will probably arise from intercepting its communication with that important part.

Thirdly, I proceed to enquire what is the most probable method of relieving the effects arising from an inflamed nerve. The general opinion is, that the nerve is only partially divided, and that a total division would free the patient from a continuance of his sufferings. Mr. Pott supposed that the wounded nerve was situated at one or the other extremity of the wound which had been made in the vein; he therefore proposed, to divide it totally, by enlarging a little the original orifice.

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It is however possible, that the point of the lancet might injure a nerve lying beneath the vein. This will be easily understood by referring to the plate. Mr. Bell directs an extensive transverse incision, to be made through the original wound ; but if the injured nerve be situated at the upper extremity of the orifice, it will remain unaffected by this operation. Mr. Bell also advises the incision to be continued to the bone ; but this appears to me dangerous and unnecessary.

If the injured nerve be inflamed, I think it doubtful, whether even a total division of it, at the inflamed part, would effectually relieve the general nervous irritation which the disease has occasioned. To intercept the communication of the inflamed nerve with the sensorium, does however promise perfect relief. This intention can only be accomplished, by making a transverse incision above the orifice in the vein. The incision need not be very extensive, for the injured nerve must lie within the limits of the original orifice, and it need only descend as low as the fascia of the fore-arm ; for all the fila-

ments of the cutaneous nerves lie above this fascia. The vein which had been opened, and some filaments of the cutaneous nerves, are all the parts of consequence which will be divided in this operation. The proximity of the division of the nerve to the vein, must be regulated by the supposed extent of the disease. However, as the extent of the inflammation of the nerve is uncertain, I submit it to the consideration of surgeons, whether it may not be adviseable, in some cases, to divide either of the cutaneous nerves, still more remotely from the injured nerve.

I find little difficulty in detecting the trunk of these nerves in the dead subject, and I should suppose but little would occur in the living state; for the compression of the tourniquet, would prevent any obscurity which hæmorrhage might cause.

Explanation of the Plate.

- A Vena basilica.
- B Vena cephalica.
- C Vena mediana.
- D Vena radialis.
- E Vena cubitalis.
- F Vena mediana basilica.
- G Vena mediana cephalica.
- H Nervus cutaneus internus.
- I Nervus cutaneus externus.

*General Observations on the ill Consequences
sometimes succeeding to Venæsection.*

I think it very probable that these diseases would less frequently happen, did not the situation of the veins usually opened contribute to their occurrence. The common offices of life so constantly demand the employment of the arm, that its motion becomes almost inevitable. Unless the orifice made by the lancet has been attentively closed; the effect of this motion will be to separate the edges of the wound from each other, and to prevent their union by the first intention. Some slight degree of inflammation will ensue; the continuance of motion of the arm causes a friction of the inflamed surfaces against each other, and thus the disease is increased. Under these circumstances, if the constitution of the patient be irritable, the inflammation will extend itself, although it may still be confined to the cellular substance, and integuments; or, perhaps, it may be transmitted to that part which has sustained most injury in
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the operation. The vein, the absorbents, the fascia, or the nerve, may in that case suffer peculiar disorder. Although the injury done by a bad lancet may contribute to the production of disease, yet I think it probable, that a patient improperly bled, would sustain no injury, if the treatment of the wound was judicious; whilst another, on whom the operation had been dexterously and well performed, would be liable to these ill consequences, if the proper attention to unite the wound was neglected.

In the account given of these diseases, they have been represented as they occurred separately; doubtless, in some cases, they may be combined.

The principal curative indications appear to be, to mitigate the inflammation about the orifice, and to preserve the arm supported in a motionless state. I need not enlarge this account, by describing the modes of appeasing inflammation and irritation, as they are well known to every surgeon.

SURGICAL OBSERVATIONS.

ON EMPHYSEMA.

MUCH praise is, in my opinion, due to Mr. John Bell, for the clear and spirited description which he has given of the state of the lungs in one kind of emphysema. The following case is related, to corroborate his remarks, and also to lead to others which I am desirous of offering to the public on the subject of emphysema in general.

CASE.

A poor woman, about forty years of age, was run over by a mail-coach, one of the wheels of which passed lengthwise over her back, and fractured several of her ribs on the right side. When brought to the hospital, she breathed with much difficulty, and an

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emphysema

emphysema of the integuments had taken place. An opening was made through the skin to let out the air; and the emphysema did not afterwards spread. The patient was bled largely; but the difficulty of breathing had increased to the third day, at which time I first saw her, in company with Mr. Harvey, under whose care she was. She had passed the preceding night without the least sleep, and breathed at this time with extreme difficulty; indeed it seemed as if she could not long continue the labour of such imperfect and distressful respiration. It was supposed that one side of the thorax was filled with air; and as it was suspected that the opposite lung might be oppressed by this cause, it was agreed to extract the air from the right side of the chest. With this view, Mr. Harvey made an opening into the thorax, in the following manner: He first made an incision about two inches in length, through the integuments, near the middle of the seventh rib, and opposite to its lower edge. He then drew the skin upwards, so as to expose the intercostal muscles which connect the upper edge of this rib to the one above it. These

he cautiously divided, as he next did the pleura. At the time this was effected, I believe the patient was in the act of expiration; for a blast of air evidently issued from the thorax; and afterwards, whilst the integuments were kept retracted, and the aperture in the pleura consequently uncovered, the external air continued to rush in during the enlargement of the thorax, and to be forced out again during its contraction. But when the divided skin was allowed to descend to its natural situation, and thus the opening of the pleura was covered, no farther passage of air took place; and all that could then be perceived, was a depression of the integuments opposite to the aperture in the thorax, occasioned by the pressure of the atmosphere during the enlargement of that cavity. I had got ready a large injecting syringe, and introducing the pipe into the cavity of the chest, I drew up the piston, and thus exhausted the air, till I found I was stopped from proceeding by the lung which had risen up and applied itself to the mouth of the syringe. The skin was then immediately brought down over the aperture in the thorax, and served like a valve,

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to prevent the further ingress of air into that cavity. About ten ounces measure of air might probably have been extracted by the syringe. As this quantity of air could have occupied but a small space when compared with the size of the thorax, it was probable that the back part of that cavity was filled with fluids. — Nothing further, however, was done at this time ; and shortly after the poor woman fell asleep, and breathed with comparative ease for nearly six hours. But the difficulty of breathing again increased during the night, and at noon on the following day, was nearly as great as ever. Mr. Harvey and I agreed, however, that it would not be wrong to inspect the thorax, to see if the lung had collapsed, or if we could by any means afford relief to the patient. Upon separating the adhesion which had formed between the skin and subjacent parts, and introducing a finger through the aperture in the pleura, we found the lung adhering to the inside of that membrane ; but upon slightly varying the patient's posture, some turbid bloody serum flowed from beneath the lung. When we had discharged as much of this fluid as

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we conveniently could, the external wound was closed; but the patient continued to breathe with increasing difficulty till about midnight, when she died.

Dissection.

On examining the body, no air was discovered in the cavity of the chest. The right lung was partially inflated, and the anterior part of it closely adhering to the pleura costalis, as far as the place where the opening had been made. About three pints of bloody fluid lay in the hollow of the ribs posteriorly, and about half filled the cavity of the chest on that side; the surface of it being nearly on a level with the opening which had been made to exhaust the air. Upon the surface of this fluid, the half-inflated lung seemed to float. — I looked for the place where the lung had been wounded by the injury; but cannot say that I could perceive it. It was, however, certainly healed; for the lung bore inflation without letting the air escape from it. The pleura was covered with coagulated lymph. The cells of the lung contained a quantity of fluid, and the whole substance of it was
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of a livid colour. — The cells of the lung of the opposite side of the chest also contained more than their ordinary quantity of fluid; its vessels were turgid, and it was hard and thickened in several places; which was probably owing to former disease. There was likewise more than a usual quantity of turbid serum in the left cavity of the thorax.

It seems to me highly probable, that there are two states of the lungs in emphysema, one of which, indeed, can rarely be proved by examination, since the patients in general do well. I have, however, met with instances in which patients affected with emphysema from a wounded lung, died of other injury, and thus been able to ascertain that the lung had not collapsed. I once also met with a proof of this fact in a patient who survived, and I will relate the circumstances of the case.

CASE.

Mr. Crowther requested me to see a poor man who was brought into a work-house with fractured ribs, accompanied with a

great degree of emphysema. The integuments covering the upper part of the left side of the thorax and neck, were elevated to a great degree by air that seemed confined in one cavity, and not diffused in the interstices of the cellular substance. The integuments of the face were also considerably inflated. The pulse was very frequent and small, and respiration quick and difficult. The extremities were cold. All these circumstances had taken place so rapidly, and were apparently increasing with so much celerity, that I thought it right, for reasons which will be mentioned afterwards, to make an opening into the cavity of the thorax which I accordingly did, between the 7th and 8th ribs, where the digitations of the serratus anticus muscle meet those of the external oblique. The external wound was made in the manner described in the foregoing case. The lung was in contact with the sides of the chest, nor did it recede when exposed. Should such an occurrence ever take place, a surgeon has the means of preventing its happening to any injurious degree, by instantly closing the wound. We next made
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a puncture through the distended integuments on the front of the chest, about opposite to the collar-bone. A blast of air escaped, and they subsided to their original level. The diffused air was expressed in some degree from the integuments of the face and neck through the same wound. A bandage was now applied round the walls of the chest, so as to prevent their motion and the escape of air into the cellular substance, and the patient was afterwards bled. No more emphysema occurred, and the patient did as well as in a case where the ribs are merely broken, and the lungs uninjured. I cannot satisfactorily account for the great quickness and difficulty of respiration that took place in this case, except by attributing it to the agitation of the patient's mind, alarmed by the inflation of his neck and face.

I have seen so many cases of emphysema, attended with very little difficulty of breathing, or other inconvenience, indeed, proceeding in a manner so like cases of fractured ribs

Ribs unaccompanied with wounds of the lungs, that I cannot suppose patients were in these cases reduced to the necessity of breathing with one lung only. These patients indeed were all treated in the manner recommended and practised by Sir William Blizard. Observing the great pain and irritation which the constant motion of the fractured ribs occasioned, he was induced to disregard the emphysema, and to confine the motion of the ribs by a tight bandage, in the same manner as when the lungs are uninjured: afterwards the patients were largely bled, and other evacuations were freely made. This practice he has since continued with general success. The pressure of the bandage in general prevents the air from escaping out of the wounded lung, and pervading the cellular substance. It will, perhaps, appear probable to many surgeons, that, for this very reason, the air will be likely to insinuate itself between the two pleuræ, and thus occasion a collapse of the lung. I do not, however, see any good reason for such a supposition. The two pleuræ remain in their natural state of contact; and there is no

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space for the air to pass between them. So frequently also are there adhesions between the surface of the lung and the sides of the thorax, that I think, in some of the cases of emphysema which I have seen, this circumstance must have occurred, and that if the lungs had receded from the sides of the thorax, the symptoms would have indicated the laceration or stretching of these adhesions.

An idea has generally prevailed among surgeons, that if the pleura costalis were divided in the living subject, the lung would immediately collapse, as it is usually found to do in the dead one. But M. Bremond* has shewn by experiments, that not only when an opening is made into the cavity of the thorax, but even when some of the ribs are removed, the lungs still occupy their natural situation, and are even thrust up into the opening during expiration. Mr. Norris has also lately shewn, by experiments undertaken for this purpose, as well as by observations on the effects of accidents, that frequently the lungs do not collapse when

* *Memoirs de l'Acad. des Sciences*, 1739.

the cavity of the chest is exposed in the living animal *; and I have also had occasion to observe, on dividing the pleura costalis in a case of supposed hydrothorax (in which, however, no water was found), that the exposed lung did not collapse; a circumstance which, I think, ought to encourage us to a more frequent performance of such an operation. In other experiments, however, the lungs have been known to collapse; and the circumstances, on which either of these effects depends, are not perhaps well understood.

For these reasons, I believe, that in most cases of emphysema succeeding to broken ribs, pressure by bandage not only hinders the air from diffusing itself through the cellular substance, but serves to prevent it from escaping out of the wounded lung, and of course facilitates the healing of the wound, which would be prevented by the constant transmission of air. Its early application, therefore, will often prevent a very troublesome symptom, whilst, at the same time,

* Memoirs of the Medical Society of London, vol. iv. p. 440.

by keeping the fractured bones from motion, it greatly lessens the sufferings of the patient.

In some cases where the lungs are wounded by the ribs, the air does undoubtedly get into the cavity of the thorax, as happened in the case of the poor woman already mentioned, and as I have seen in other instances. When the air passes from the wounded lung into the cavity of the chest, and the lung becomes in consequence collapsed, still the symptoms and progress of the complaint will differ from the effect of circumstances which have not been much attended to. When the wound in the sides of the thorax allows of the expulsion of air from that cavity during expiration, and does not admit air during inspiration, it is not to be supposed that the wound of the lung can heal; for the cavity of the thorax must, under these circumstances, be filled from the wounded lung every time that it is enlarged during inspiration.

But this state of circumstances, which is so particularly injurious, and which usually takes place when the lung has collapsed in
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the manner described, it is the business of the surgeon to remedy : and it may be accomplished in two ways ; First, by preventing the escape of the air from the cavity of the chest, in which case the necessity of its being filled from the wounded lung will, in a great measure, be done away. And as I know surgeons have apprehended, that if an outlet was not given to air from the cavity of the chest, the opposite lung might become oppressed, I beg them to reflect a little on the state of respiration under these circumstances.

To examine this subject, let us suppose the thorax expanded, and one of its cavities filled with air, at which time the patient attempts to make an expiration ; what will be the effect ? The air cannot return through the wound in the lungs ; and we have supposed that it cannot escape through that in the pleura costalis. The muscles of respiration are unable then to produce any considerable change in the dimensions of the cavity, without an exertion productive of pain, which it is not probable that they will make ; the in-

active diaphragm will not be thrust up into the hypochondrium as in natural expiration, and the ribs will remain nearly stationary; but in proportion to the degree of the expiratory effort that is made, the air may be condensed, and the mediastinum thrust to the opposite side of the chest. But no injury will arise from this pressure, neither can it happen in any great degree; for both sides of the chest being diminished at the same time, a slight compression of the opposite lung cannot be detrimental, since it helps to express the air from it, — the very effect which is now required; and as that lung is pressed inwards by the sides of the thorax, it will counteract any great pressure made on the mediastinum. Upon inspiration taking place, the condensed air will expand and fill the enlarged cavity, and the mediastinum will regain its natural situation; so that the function of the sound lung is scarcely, if at all, impeded by the compression which takes place on the opposite side of the chest.

In whatever state the lungs happen to be when they are wounded, a bandage, if it can
be

be borne, seems therefore to me extremely useful. By means of it, the pain and irritation, which the motion of the fractured ribs must otherwise occasion, are, in a great measure, or entirely, prevented. In that state of the lungs which I have first described, the pressure of a bandage prevents emphysema, and does no harm; in the other, it not only prevents emphysema, but does good, by keeping the collapsed lung at rest, and thereby free from the necessity of constantly transmitting air. Patients, however, will not always be able to wear a bandage when one lung is collapsed (particularly if any previous disease has existed in the other), as it equally confines the motion of the ribs on both sides, and as every possible enlargement of the chest becomes necessary for the due admission of air into the lung which still executes its functions. Under these circumstances, if the emphysema continues (and its continuance must always denote that the wound in the lung is not closed), I should esteem it the best practice to make a small opening into the chest, so that the external air might have free communication with that

cavity ; and then the injured lung must remain motionless till its wound is healed, and the mediastinum will, in every state of the thorax, preserve its natural situation.

As almost all the circulating blood must, in such cases, be transmitted through the vessels of one lung, if the quantity of that fluid be not greatly diminished, the pulmonary vessels will become turgid ; a larger effusion of fluids will therefore take place into the air-cells and cavity of the chest, and thus the function of the acting lung will be materially impaired. This reasoning illustrates what experience has already determined, viz. that the preservation of life in these cases depends on the most copious blood-letting.

The case, which I have related, clearly shews, that the collapsed state of the lung affords an opportunity for the wound of its surface to heal ; and when this desirable event is accomplished, the air which is at that time in the cavity of the thorax, will be speedily absorbed, and the lung will again
acquire

acquire its former size and situation. But should the function of it be more immediately necessary, from a diseased state of that on the opposite side, or from other circumstances, it may be more quickly restored by exhausting the air, in the manner described. If the cavity of the chest contain a quantity of fluids, and it is thought right to extract them, it cannot well be done by varying the posture of the patient so as to let them run out of the opening that has been made: the difficulty with which respiration is performed, will render such an attempt almost insupportable to the patient. It would therefore be better to introduce a hollow bougie, or some such instrument, into the posterior part of the thorax, there connect it to the syringe, and thus extract the contained fluids. I need scarcely add, that the same method may be employed with advantage for the extraction of water from the cavity of the chest in hydrothorax.

The great advantage of retaining the lung in a collapsed state is, if possible, more strikingly shewn when those bodies have suffered
a greater

a greater degree of injury than can occur to them from the fracture of a rib. I have seen cases in which bullets have passed through the lungs, near the root of those bodies, and where many of the large vessels were consequently torn, in which the blood has been poured into the cavity of the chest, has condensed the lung by its pressure, and thus suppressed the hæmorrhage. The injured vessels might, under these circumstances, unite; and the blood being let out of the thorax, the lung might gradually be restored to its former function. Yet in the cases which I was a witness to, the patients died of inflammation and fever; but the particular nature of the circumstances was unknown during the life of the patient; and of course the conduct appropriated to them was not pursued. The fluid contained in the cavity of the thorax had in these cases undergone a degree of putrefaction previous to the patient's death; which state required its discharge.

But should this be attempted in other cases, it becomes very essential to keep the
thorax

thorax filled with air, lest the lungs should become prematurely inflated, the newly-healed part lacerated, the hæmorrhage renewed, or inflammation induced; and the surgeon would be able, I believe, without much contrivance, to regulate the inflation of the lungs, as circumstances seemed to indicate. Surgeons used formerly to keep canulæ in the thorax in these cases, with a design to give an outlet to fluids; but such means might have been beneficial by preserving the lungs collapsed; and they might have been continued from being found serviceable, though the manner in which they became so was unknown.

SURGICAL OBSERVATIONS.

ON THE OPERATION OF PUNCTURING THE URINARY BLADDER.

M^{R.} Home, to whom the profession is much indebted for many important improvements in practice, has of late published some cases of the puncture of the bladder from the rectum, which, in opinion, are of the greatest importance. They not only exhibit that operation as more simple and successful than perhaps was generally believed, but if the operation be as successful in the hands of other surgeons, it presents an easy mode of relief to a great number of unfortunate patients, who have generally been left to die in misery. I mean those who have strictures impassable by bougies, and who are so irritable that they cannot bear

the application of caustic, on account of the retention of urine which it occasions. In such cases the puncture from the rectum appears most eligible, because the bladder is contracted, is in general irritable, and will not perhaps ascend high enough to admit of being punctured above the pubes.

But there are cases in which the operation by the rectum cannot be performed, and by frequently meeting with these I have been compelled to puncture the bladder above the os pubis, and the event of the operation has been such as would have led me to prefer it to any other that I had seen practised. The chief cases to which I allude are those of enlarged prostates, where the catheter has been forced into the substance of the gland, and has torn it considerably; consequently that instrument enters so easily into the false passage as to render it almost impossible to make it take the right one. Indeed in cases of stricture, where false passages have been made, and the prostate has been found, the perception of the bladder from the rectum has been so indistinct that I have been de-

terred from puncturing it; and in one case I made a division in the perinæum, and having passed my finger beneath the arch of the os pubis a considerable way, I could obtain no such distinct perception of the bladder as would authorise me to push in a trochar. But I punctured it above the os pubis, and drew off a considerable quantity of urine. I have therefore been led to conclude, that in some distended bladders, there is a kind of recession of them from the perinæum, and that when they become distended they ascend proportionally higher into the abdomen.

In the greater number of cases in which I have punctured the bladder above the os pubis, it has been on a sudden call to the hospital, or some poor house; and I have had little further concern with the patient than what related to the performance of the operation.

Sometimes I have been in doubt if there was much urine in the bladder, and this circumstance has deterred me from puncturing,
except

except in that situation in which I could possess an assurance that I felt the bladder, and could puncture that viscus : and these doubts caused me in some instances to puncture the bladder with a lancet ; and in some cases I have not left any canula in the bladder, in consequence of the escape of the urine preventing me from readily finding the opening which I had made. Several of the patients died, but in every instance the operation relieved their sufferings ; and I have never seen any effusion of urine into the cellular substance, or any other bad consequence result from the operation ; nor do I think that such events are likely to happen, if it be rightly performed. The death of the patients was fairly to be imputed to the delay of the operation, or the degree of disease which previously existed in the urinary organs. In several patients who recovered, the progress of their amendment was similar to that which took place in the case, which I am about to relate. I did not, however, preserve any detailed account of them, for, as I have mentioned, the patients could scarcely be said to be under my care. I have
requested

requested the last gentleman, with whom I attended a patient under these circumstances, to give me a particular account of his case, and on the accuracy of his narrative I can place perfect reliance. This case I shall relate, in order to have an opportunity of commenting on the mode of puncturing the bladder above the os pubis.

C A S E.

A gentleman, between sixty and seventy years of age, had a retention of urine from an enlarged prostate gland, which obliged his surgeon to draw off the urine night and morning. This was done during ten days, when the difficulty of introducing the catheter, which had gradually increased, became insurmountable. I was therefore obliged to puncture the bladder, and the only place in which this operation could in the present instance be performed, was above the pubes. I therefore made an incision about two inches in length through the integuments, and between the muscoli pyramidales abdominis, so that the lower part of the wound laid bare the top of the symphysis pubis. On intro-

ducing my finger into this vacancy I felt the distended bladder. The sensation produced by pressing against the distended bladder is I think so peculiar, and so different from any thing else which could occur in this situation, that if an operator has once felt it, he will not hesitate in deciding that it is the bladder against which he presses. The thickness and tension of its coats, and its fluid contents are the chief circumstances from which this peculiar feel seems to arise. When I first began to perform this operation, I was deterred from using a trochar by a fear of being misled by my sensations. I cautiously punctured the bladder with a lancet, designing to introduce a catheter through the wound; but the urine gushed out so violently, and the bladder became contracted so suddenly, that I could not discover the wound which I had made; yet under these circumstances, the urine passed from the aperture in the bladder, through the external wound, and was not diffused into the cellular substance. Indeed neither observation nor reasoning would induce me to suppose that such an occurrence is probable, whilst there

is a free external opening. The apprehension seems to have arisen from the extensive diffusion of urine, in cases where the urethra has given way. But in such cases, the urine is actually injected into the cellular substance, and with great force, by the bladder, in consequence of the channel out of the body being closed up. If the external wound in this operation were to be closed, and the exit of urine prevented by this means, then it is probable that the urine would be forced to pervade the cellular substance. It may be asked, if urine is in any way likely, according to the common phrase, to insinuate itself into the surrounding cellular substance? I should think not. The operator should be cautious not to make any separation of the bladder from the back part of the symphysis pubis, that there should not be even a cavity into which the urine might gravitate. He should also leave the external wound free and open. The first effect of the operation will be an inflammation, which will consolidate the surrounding cellular substance, and prevent the ready impulsion of urine into it. The stimulating

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qualities

qualities of the urine will augment this inflammation, and thereby increase the effect. Indeed the stimulus of the urine often occasions a sloughing of the surface of the wound, which however makes no alteration in the general circumstances of the case. In later operations I acquired more confidence, and a belief that I could distinguish the bladder from any thing else by its feel; and one case which occurred tended further to embolden me in the performance of it. Being called on a sudden to relieve a patient, who had had his urethra lacerated, and being urged to puncture the bladder by several gentlemen who were present, and who were certain that a considerable quantity of urine was detained: though I could not feel the bladder distended above the pubes, I consented, as the patient was in imminent danger, to perform the operation, and having punctured the bladder with a trochar, four or five ounces only of urine were discharged. However a large quantity of urine gradually flowed through a canula which was introduced. The patient died, and was examined, when the cause of this occurrence

became apparent. A large cyst made by the protrusion of the internal coat of the bladder, had been formed between the bladder and the rectum, which contained the greatest quantity of the retained urine. The orifice, by which this cyst communicated with the bladder, did not exceed in dimensions the barrel of a common quill. It also appeared that, though the bladder itself could not in this case be said to have been distended, yet the front of it only was wounded by the trochar, and the back part was uninjured.

To return from this digression to the operation in the case which I was relating: after I had, by an incision between the pyramidales muscles, enabled myself to pass my finger along the upper part of the symphysis pubis, so as to press against the distended bladder, I introduced a common trochar of the middle size, in a direction obliquely downwards. There is an advantage, as Sabatier, in his *Medicine Operatoire*, observes, in introducing an instrument in this direction, for it accords with the axis of the bladder, and is therefore not likely to injure the op-

posite side of that organ. When I found that the instrument had penetrated the cavity, I withdrew the stilet within the canula, and then pushed the canula obliquely downwards, so that about two inches of it were introduced into the bladder. On withdrawing the stilet of the trochar, the urine gushed out with great force, but I prevented its escape, by placing the thumb of my left hand against the mouth of the canula, and then introduced through it in the same oblique direction, a middle sized hollow elastic catheter, till it met with resistance by touching the bottom of the bladder. After the urine was discharged, the canula of the trochar was withdrawn over the elastic catheter, which was left in its situation, and the end which came out of the wound was bent downwards towards the pubes, and attached, so as to be kept motionless, to a circular bandage put round the body of the patient. The wound, which was funnel-shaped, being wide externally, and gradually contracting to the bladder, was covered with linen, spread over with spermaceti salve. The urine flowed not only through the catheter,

catheter, but by the sides of it. A slight inflammation occurred round the wound, such as would doubtless tend to consolidate the surrounding cellular substance. The surface of the wound in this case did not even slough, at least in any evident degree. Four days after the operation the patient got up, and walked about his chamber, and feeling himself comfortable and well, he did not go to bed again till night. At the end of a week some few drops of urine came through the urethra, and the quantity thus discharged daily increased. At this time as the catheter seemed to be clogged up with mucus, it was withdrawn, and another was introduced with perfect facility. In about three weeks, as the urine came pretty freely through the urethra, the catheter was withdrawn, and the patient voided his urine by the natural channel. In six weeks the external wound was perfectly healed, and the patient was as well as before the retention of urine took place.

Since the publication of the preceding case, I have many times performed the same
 O 4 operation,

operation, and without observing any thing contradictory to the statement which I have given. I shall briefly relate the particulars of one of the cases.

CASE.

A gentleman, who came from the country, was seized with retention of urine, and the medical man to whom he first applied for relief was unable to draw off that fluid. Before I made any attempt, I first introduced a bougie, which, I think, ought in all cases to be done, in order to examine the state of the parts prior to the introduction of more rigid and injurious instruments. It passed into the prostate, but could not be made to proceed further. A small sized catheter much curved, or bent upwards towards the point, was next introduced, which entering the bladder, the urine discharged. Upon attempting to withdraw the catheter, I found that I could not do it without employing considerable force, so firmly was it compressed by the neck of the bladder. I examined the prostate per anum, and did not find that gland materially enlarged, so that I conclude the difficulty

difficulty of introducing and withdrawing the instrument arose from an enlargement of what Mr. Hunter called the valvular part of the prostate, and Mr. Home describes as its third lobe. Being fully aware of the improbability of my being able to introduce a catheter night and morning to draw off the urine, in this case; I employed for that purpose, at my next visit, a flexible varnished catheter, and left it in the bladder. This gave pain to the patient, and did not long remain in the cavity of the bladder; I was therefore under the necessity of attempting to draw off the urine twice a day with the common catheter. I succeeded in doing this for several days, each time encountering a difficulty in introducing the instrument, which was surmounted by keeping the point of the instrument closely in contact with the upper part of the canal; and I continued to experience considerable difficulty in withdrawing the instrument after the escape of the urine. One morning, however, I was unable to accomplish the introduction of the catheter, and felt myself obliged to puncture the distended bladder. The operation was performed as
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in the preceding case. A month elapsed before the patient voided any urine by the natural channel. The quantity of that fluid which was discharged through the urethra when he wanted to make water was at first small, and gradually increased in another fortnight to about four ounces. After this evacuation, the plug being removed from the tube inserted at the pubes, six or eight ounces of urine were discharged from it; it therefore appeared, that the bladder had but very partially regained its power of expelling the urine. When this operation is performed, we can know with some degree of accuracy when the bladder has fully regained its powers; and, consequently, when we ought to remove the tube. The patient was very anxious to return into the country, and I knowing the great impediment that existed to the expulsion of the urine in his case, dared not to remove the tube; nor has it appeared proper to do it since that time. He has now kept the tube in his bladder, I believe, more than two years. He has lately complained much of the badness of the varnish with which the tubes are covered; and

and it is greatly to be regretted, that in this country, no one has the art, or takes the trouble, of varnishing these catheters as they are done in France.

On the Tic Douloureux.

As the public attention has been of late excited to that painful affection of the nerves, called Tic Douloureux, I shall in the next place relate a case of that disease, which lately came under my care, because it seems to me to elucidate the nature of the disorder, to demonstrate the degree and kind of advantage which is likely to result from the division of the trunk of the nerve, and also to illustrate some circumstances in the anatomy and physiology of the nervous system, of which I have not as yet met with any satisfactory explanation.

CASE.

A lady became gradually affected with a painful state of the integuments under and adjoining

adjoining to the inner edge of the nail of the ring finger of the left hand. No injury to the part was remembered which could have brought on this disease. The pain occurred at irregular intervals, and was extremely severe during the time of its continuance, which was for a day or two, when it usually abated. Accidental slight injuries always occasioned great pain, and frequently brought on those paroxysms, which however occasionally occurred spontaneously, or without any evident exciting cause. In all these particulars the disease correctly resembled the Tic Douloureux of the nerves of the face. As the pain increased the disorder seemed to extend up the nerves of the arm. After the patient had endured this painful affection for seven years, she submitted to have the skin, which was the original seat of the disorder, burned with caustic. This application gave her intense pain, and on the healing of the wound she found her sufferings rather augmented than diminished by this experiment. After four more years of suffering she consulted me, when the circumstances of the case were such as to render
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an operation indispensably necessary. The pain of the part was intolerable, and it extended all up the nerves of the arm; and this general pain was so constant during the night, as to deprive the patient of rest. The muscles of the back of the neck were occasionally affected with spasms. The integuments of the affected arm were much hotter than those of the opposite side, and sometimes the temperature was so increased as to cause a burning sensation in them. Under these circumstances, I did not hesitate to divide the nerve of the finger, from which all this disorder seemed to originate. I laid it bare by a longitudinal incision of about three quarters of an inch in length, from the second joint of the finger, and divided it opposite to that joint, by a curved sharp pointed bistoury which was conveyed under it. I then took hold of the nerve with a pair of forceps, and reflecting it downwards, I removed a portion of it half an inch in length, that the possibility of a quick re-union might be prevented. The wound was brought together by sticking plaster, and it united by adhesion: but the upper part of the wound,

opposite

opposite to the upper end of the nerve, became slightly inflamed, and was very painful; however the appearance of inflammation gradually went off in the course of three weeks. After the operation I pinched the originally affected integuments sharply with my nails, without causing any sensation; but if in so doing I moved the finger, then pain was felt. I found it difficult to convince the patient that the skin at that part was actually devoid of sensation, for she still continued to feel similar sensations to those which formerly occurred, though in a much diminished degree: but she became gradually as perfectly convinced as any medical man could be, that these sensations arose from the irritated state of the end of the nerve, above the place where it was divided. The painful affection of the nerves of the arm still continued, though considerably lessened in violence; however, it was sufficiently severe to make the patient apprehend that little permanent benefit would arise from the operation. This pain continued occasionally about four months, with varying degrees of severity, but the temperature of the skin was not

hotter than that of the opposite side, as it had been before the operation. At the expiration of three months, the patient ascertained that the integuments at the end of the finger actually felt when any thing was applied to them, and this proved a new source of alarm. More than nine months have now elapsed since the performance of the operation, and the general pains in the nerves have become very trivial; but the sensation of the integuments at the end of the finger has during that time gradually increased, and the skin has now its natural sensibility, so as accurately to distinguish the tangible properties of any body applied to it. If also the originally affected part be compressed slightly, painful sensations resembling those which formerly occurred take place.

The observations of Dr. Darwin relative to ocular Spectra, and the experiments of Mr. Home on the contraction of divided nerves (contained in the Croonian Lecture, inserted in the Philosophical Transactions for the year 1801) have given a kind of demonstration that there is a subtile and mobile
matter

matter superadded to the visible fabric of nerves, and sanction the use of the yet novel terms of the irritability and irritable actions of nerves, and I shall therefore employ them in the few subsequent remarks which I have to offer.

The case above related appeared to me to merit publication, because I believe it is not a common occurrence for the tic douloureux to happen any where but in the face. In the instances related by Mr. Home in his Croonian lecture, the disease was the effect of an injury done to the thumb; and it is reasonable to suppose that it would not have taken place without a predisposition to it in the constitution of the patients. It is also not unfair to conclude that the disease thus occasioned was of a more general nature, and less confined to the extreme branches of the nerves, and therefore less susceptible of cure by an operation. The case, which I have related shews, as indeed might have been concluded *a priori*, that though the source of the irritable state of the nerves in the tic douloureux may be cut off by an operation, yet that the
general

general irritable actions of those organs, which had been excited, and had continued for a long time, would not immediately cease, though they might, as happened in this instance, gradually subside.

The speedy return of sensation, which is both accurate and acute in the present case, must surely be deemed a curious circumstance. It cannot be attributed to a reunion of the divided nerve, since so large a portion of it was removed; for I believe in simple divisions of the nerves by accident, sensation is slow in returning. It must, I think, be admitted, that sensation in the present instance took place through the medium of the communicating branches of those organs, and probably its speedy renovation was the effect of their unusually active or irritable state.

Nerves strikingly resemble arteries in their modes of communication; sometimes they conjoin even by considerable branches, such as must be manifest, in common dissections; but they communicate in surprizing numbers

by their minute ramifications. This circumstance is not perhaps so familiarly known to professional men, since it cannot be perceived unless in the course of a very minute dissection, and to understand how numerous these communications are, the representations given by the German authors, of their delicate and laborious dissections, may be advantageously consulted *.

The communications of nerves seem also not to have excited much attention amongst physiologists; at least I have not met with any probable conjecture concerning their use. I shall therefore take the liberty of mentioning as briefly as possible, what has occurred to me on that subject.

The opinions of Mr. Hunter respecting a subtle matter inhering in the brain and nerves, and diffused throughout the body, are, I believe, generally admitted, though variously expressed. Now if the brain and

* See Meckel's Representation of the Nerves of the Face, or Frotfcher's of the Cervical Nerves, in Ludwig's Opera Minora, or Walther's Plates.

nerves be supposed in those animals who possess them, to be the chief if not the sole organs for the preparation of this subtile matter, then it appears as necessary that the nerves should communicate, as that the arteries should do so. For if the continuity of the trunk of either of these organs were destroyed, the parts, which its branches supply, would perish were it not for their communication with the minute branches of other adjacent trunks. It is probable that one of the advantages derived from important organs being supplied from plexuses of nerves is, as has been suggested by Soemmerring, that such essential organs should never want that animation and influence, which they derive from the nerves, even should casual obstruction take place in some of the trunks leading to such a plexus. But parts less essential to life, equally require that such interruption of the nervous energy should be guarded against. Have we not a plexus formed in the axilla, prior to the distribution of nerves, to the upper extremities? do not the sacral nerves form a plexus, in order to form the ischiadic or posterior crural nerve?

and may not the same circumstance be affirmed with respect to the anterior crural, and obturator nerves, since they arise from the complicated union of the lumbar nerves, with a branch of the first sacral nerve? The reticular communications of the minute nerves may not only serve the purpose which has been suggested, but, as appears from the present case, the actions which take place in the extremities of the nerves may, by them, be propagated to the sensorium, and thus produce sensation. Whether, in the present instance, the original painful actions of the extremities of the nerves may again recur, and be continued throughout the communicating branches to the sensorium, the future progress of the case will determine.

The Lady, whose case I have related, died about four years after the operation, of disorder of the digestive organs, to which she was habitually subject. Indeed, from what I have since seen of cases of Tic Douloureux, I am induced to believe, that this disorder is as much constitutional as either Gout or Rheumatism. I have known patients afflicted
with

with it get well, either spontaneously, or in consequence of the administration of medicines which were likely to relieve or counteract nervous irritability.

*On the Removal of loose Substances from the
Knee Joint.*

I shall next relate a case in which some of those loose substances that are frequently found in the knee-joint were removed by an operation; because I think the case contains many interesting particulars, and because it will afford me an opportunity of offering a few observations on the necessity and mode of performing such an operation. Mr. Hey has of late recommended a bandage to keep these bodies stationary, and has related several instances of its efficacy, and of course of its preventing the necessity of undertaking a serious and uncertain operation. When loose substances exist in the knee-joint, and are lodged on either side of the patella, they produce but little inconvenience; but when

they slip under the ligament of the patella, and become interposed between the condyles of the os femoris and the tibia, they impede progression, and cause pain, and so much injury as to bring on inflammation in the joint. If the extensor tendons, the patella and its ligament, can, by Mr. Hey's bandage, be kept steadily pressed against the corresponding parts of the joint, then these bodies must remain stationary on one or other side of the patella, and the patient will be exempted from the inconvenience and injury which their motion in the joint occasions. Under these circumstances the necessity for an operation is obviated; but in the case which I am about to relate the bandage was of no avail, for reasons which will appear in the relation. It is not improbable also that though these bodies may occasion much irritation at first, yet that the joint becoming accustomed to their stimulus may afterwards be less affected by their presence, which circumstance ought to be adverted to and ascertained before an operation be undertaken.

CASE.

A man, about forty years of age, having fallen from a ladder, and injured his knee, suffered afterwards a good deal from inflammation in the joint. The joint became much better, but never perfectly recovered; and after a year had elapsed he slipped in walking, and again injured his knee. From this time he became sensible of the presence of two moveable bodies in the joint, which incommoded him considerably. They frequently, in walking, got between the condyles of the os femoris, and the crucial ligaments, giving him great pain at the time, and produced heat and inflammation of the knee afterwards. He bore this inconvenience for several years, till at length, coming to London, he resolved to submit to the operation for their removal if it were recommended. When I saw him there was a considerable quantity of synovia in the joint, the knee was hotter than that of the opposite limb, and in this state he said it usually was. There was no difficulty in bringing the two loose substances to the

inner side of the joint; and it required only to put that part in a depending position, and those bodies descended by their gravity through the fluid, and were easily fixed in the situation to which they had fallen. I could bring them on the inner surface of the internal condyle of the os femoris, which is of considerable extent, and by placing the points of my finger so as to describe a portion of a circle, I could prevent them from passing again into the cavity of the joint although the limb might be moved, and the patient press firmly against them with his finger, as if he meant to push them into the joint. Yet when my fingers, which thus confined them were removed, the slightest touch caused them to disappear, and to glide with velocity into the general cavity of the joint.

This is the situation, and the manner in which I think these bodies can be most conveniently and certainly fixed. The inner surface of the internal condyle of the os femoris presents an extensive and nearly plain surface, which terminates in front and at its
upper

upper part by an edge which forms a portion of a circle. If the points of the finger be firmly pressed upon this edge so as to form a kind of line of circumvallation round these bodies, they cannot pass into the joint in this direction, nor can they recede in any other, on account of the tense state of the internal lateral ligament. Here these substances are near the surface, and may be distinctly felt; and there is nothing to be divided in order to expose them, but the integuments, fascia, and the capsule of the joint. Mr. Cruikshank says, that Mr. Hunter preferred removing these loose bodies at the upper part of the joint, as there, the bag which contains the synovia has less of the nature of a capsule. Mr. Ford, in a case which required the operation (and which is related in the Medical Observations and Inquiries), extracted the substance on the outer edge of the patella; and if the substance is large, it may undoubtedly be extracted in this situation. In the case, which I am going to relate, it would have been impossible to fix the loose substances in any other situation than that which I have described, and in my opinion

opinion that situation must in most cases be preferable to any other, for the reasons which I have mentioned.

I did not hesitate to undertake the removal of the bodies in the present case, as they could be so securely fixed. For the patient had tried bandages without any advantage, which perhaps was owing to the quantity of fluid in the joint preventing them from acting in the manner mentioned above. His sufferings were very considerable, and the necessary restriction in exercise extremely inconvenient. I thought it right to reduce the inflammation of the joint as much as possible, prior to the operation, and with this view directed the application of leeches, and of linen kept constantly damp with Goulard's wash: some aperient medicine was also given. By these means, in the course of three days, all the fluid was removed from the joint, and it was as cool, and free from pain and inflammation as the other knee; but when I endeavoured to get these bodies into the situations in which I had formerly fixed them, I found all my efforts were in vain.

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There was no fluid for them to descend through, and though one of them could be got into the situation which we wished, we could not, after trying nearly an hour and an half, succeed in getting both of them upon the condyle of the os femoris. I was therefore obliged to let the patient walk about a little, that some more fluid might be effused into the joint, and then I could bring them both into the same situation, and fix them as readily as before.

The operation was done in the following manner. Sir Charles Blicke, who assisted me, pressed the integuments of the knee gently towards the internal condyle, and then applied his finger in the manner I have described, round the circular edge of the bone. I also drew the integuments gently towards the inner ham-string, and divided them longitudinally, immediately over the loose substance, to the extent of an inch and an half. This withdrawing of the integuments from their natural situation was designed to prevent a direct correspondence in the situation of the external wound, and that
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of the capsule of the joint ; for when the integuments were suffered to regain their natural position, the wound in them was nearer to the patella, than the wound which was made in the capsule. The fascia which covers the joint being exposed by the division of the integuments, it was divided in a similar direction, and nearly to the same extent. The capsule was now laid bare, and I gently divided it to the extent of half an inch, where it covered one of the hard substances, which suddenly slipped through the opening, and by pressing gently upon the other, it also came through at the same part. The bodies, which were thus removed, were about three quarters of an inch in length, and half an inch in breadth. They had a highly polished surface, and were hard like cartilage. The fluid contained in the joint was pressed towards the wound, and about two ounces of synovia were discharged. I then drew the wound of the integument gently towards the patella, pressed the two sides together, and closed it accurately with sticking plaster, enjoining the patient to keep the limb as free from motion as possible.

No

No inflammation took place in the knee, either on that day, or the following ; but on the second night after the operation the patient suffered a good deal of pain, and in the morning the joint felt hot, and was distended with fluid as it had been before the operation. I now removed the dressings, and found the wound was closed ; but I felt very apprehensive lest, the inflammation of the joint continuing, the collection of fluid should also increase, and by distending the capsule, cause the wound to open. Having already seen in this case the beneficial effects of evaporating washes, which by diminishing the heat of a part check its tendency to inflammation, I was desirous of re-applying them. In order to prevent these applications from loosening the sticking-plaster, and causing the exposure of the wound, I made use of an expedient, which I have frequently employed, and which from its utility I think deserves to be mentioned. After having supported the sides of the wound in their situation by adhesive plasters as at first, I put over them a piece of linen which extended beyond them in every direction. This linen was made to

adhere to the surrounding skin, by smearing over the edge with a solution of sealing-wax in alcohol, and afterwards varnishing the linen over with the same solution. The alcohol having evaporated, and the sealing-wax remaining, no liquid could penetrate and detach the sticking-plaster. This is the same varnish with which some parts of electrical machines are coated, and its power of remaining unaffected by moisture and moderate warmth is well known.

Folded linen kept damp with laudanum and water was now applied, in the proportion of an ounce of the former to a quart of the latter. This wash I prefer, for the purpose above mentioned, to Goulard's wash; for the precipitated powder contained in the latter is apt to fill the interstices of the linen, and prevent its imbibing the wash, so that the requisite evaporation does not go on. These applications quickly diminished the heat of the knee, and the quantity of fluid contained in the joint speedily decreased. The wound was daily dressed, and in a week was firmly healed; and in a fortnight the

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patient

patient might be said to be well. He has since the operation walked as much as he was accustomed to do, and has not found the least inconvenience.

I have since the publication of the preceding case, seen one of the same kind, so curious on account of the number of loose bodies contained in the capsule of the knee-joint, that it seems to deserve being mentioned. I do not exaggerate, when I say, they must much exceed a hundred in number, and feel like shot of various sizes, distending the capsule on either side of the patella. There is no fluid in the joint, nor do they prevent the patient from taking ordinary exercise.

*On the Treatment of one Species of the
Nævi Materni.*

I shall relate two cases, and say a few words on the treatment of this complaint, which is a congenital deformity, consisting of a cluster of enlarged vessels, filled, and occasionally distended by the influx of blood from numerous surrounding arteries. The deformity to which I allude is so well known, and so frequent an occurrence, as to preclude the necessity of any description. Mr. John Bell has of late proposed an ingenious theory of its formation, and has denominated it an aneurysmal enlargement of the vessels, in consequence of their anastomoses. There can be no doubt that the repletion, distention, and consequent enlargement of the dilated vessels depends upon a kind of inflammatory action of the surrounding arteries; for, if that be wanting, the mark ceases to enlarge, and if present, it increases in size in proportion to the degree of inflammatory action. In many cases these marks having increased to a certain degree, cease
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to enlarge; they then remain stationary, or gradually diminish, till they almost disappear. This occurrence is not so frequent as to induce surgeons to expect such an event, or to prohibit, in consequence of such expectation, their removal. For, if they continue to enlarge, the operation must be commensurate to their size. The consequences of their bursting are alarming and vexatious. It is not, however, my intention to speak of these affections in general, but only to state what, perhaps, may in some instances be done with success, when the removal of the unnatural structure cannot be accomplished. For this preternatural enlargement of vessels is not always cutaneous. I have seen it occupying the whole substance of the cheek, neither appearing beneath the skin nor the membrane of the mouth: I have met with it in the orbit of the eye, and have found it covering the whole of an extremity, or nearly one half of the trunk of the body. If any means can be pursued, under such circumstances, to check the progress of the complaint, they surely deserve attention. I was lately so fortunate as to succeed in

such endeavours, in cases, the relation of which is my chief object at present.

CASE.

A child about two months old was brought to St. Bartholomew's hospital, with this unnatural enlargement of vessels, distributed every where beneath the fore-arm, from the wrist to the elbow. In a short time it had swollen to that degree, that the circumference of the affected fore-arm was twice the size of the other. The vessels were large and contorted; and to give the reader an idea of their appearance, I may mention that the child's mother affirmed that they resembled the entrails of a pig, with which she had either been frightened or disgusted during her pregnancy. The skin was of a dusky hue, and had not its natural smoothness of surface. The heat of this fore arm was much greater than that of the corresponding sound one. Pressure forced the blood out of the vessels, and for the time diminished the bulk of the limb, and made it of a paler colour. The child's mother lives at Turnham Green, where Mr. Graham, an ingenious surgeon, who
was

was for a long time a student at St. Bartholomew's Hospital, also resides. I requested this gentleman to take charge of the case, and try the effect of the following plan of treatment, which it seemed to me right to institute. First, I was desirous of ascertaining whether a permanent and equal pressure would not prevent the distension and consequent enlargement of the turgid vessels; secondly, whether reducing the temperature of the limb would not diminish the inflammatory action, upon which their repletion seemed to depend. These two intentions admitted of being readily accomplished. A many-tailed bandage of sticking plaster seemed adequate to effect the first, and wetting the limb with water the latter. These measures were judiciously carried into effect by Mr. Graham; the pressure was first made slightly, and afterwards more forcibly, as the part seemed to bear it without inconvenience. A roller was applied over the plaster, and kept wet, if the limb felt hotter than natural, so as to regulate its temperature. The success of these measures exceeded our most sanguine expectations. The size of the limb

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gradually

gradually diminished, and its temperature became natural. After six months, Mr. Graham removed the bandages, which it was not necessary to continue any longer. The limb was in some degree wasted, from pressure and disuse, but it soon gradually re-acquired its natural size. After the bandages had been left off for a month, I saw the child. The skin was pale, and had a slightly shrivelled appearance. The contorted vessels felt like solid chords interposed between it and the fascia of the fore-arm.

CASE.

A child had this unnatural state of the vessels in the orbit of the eye. They gradually increased in magnitude, and extended themselves into the upper eye-lid, so as to keep it permanently closed. The clustered vessels also projected out of the orbit, at the upper part, and made the integuments protrude, forming a tumour as large as a walnut. Of course, the removal of this disease did not appear practicable. I was consulted on this case by Mr. Hurlock, to whom I related the success of the former experiment.

Pressure

Pressure to any extent was here evidently impossible: but the abstraction of heat, and consequent diminution of inflammatory action might be attempted. I recommended that folded linen, wet with rose water, saturated with alum, should be bound on to the projected part, and kept constantly damp. Under this treatment the disorder as regularly receded as it had before increased. After about three months it had gradually sunk within the orbit, and the child could open its eye. Shortly afterwards all medical treatment was discontinued, and no appearance of this unnatural structure remains,

A third case of a very extensive mark of this description, covering the back and shoulder, got well, as I am informed, by the same treatment. I have not, however, been able to learn the particulars. It appears to me probable, from the foregoing cases, that if the preternatural distention of the vessels could be prevented, the blood would coagulate in them; and thus this unnatural con-

texture of vessels, being rendered impervious, might become obliterated.

Since the publication of these cases, which is more than four years ago, I have seen many instances of such affections, and they have ceased to grow, and afterwards shrunk, and been no longer objects of any consequence when treated in the manner that I have described. I have only in one case been called upon to perform an operation for the removal of the swelling, which had attained a very considerable magnitude before I was consulted respecting its treatment.

On Hæmorrhoidal Diseases.

Mr. Hey of Leeds, in his highly valuable Observations, describes his mode of treatment of the proidentia ani, and that chapter of his work appears to me to deserve particular praise, because I have not found the same treatment recommended by other writers; and because, from the accounts of the patients themselves, it has relieved them from very great inconvenience and suffering. Wishing to corroborate the statement there given, and to add my mite of observation on the practice that is best adapted for the relief of such diseases, I may mention, in the first place, that my attention to this subject was particularly excited, even during my apprenticeship to surgery, from witnessing the sufferings of those who underwent what I may call the natural cure of piles. When these organised bodies are large and numerous, they impede the expulsion of the fæces, and the straining consequent to this impediment everts the bowel. When, at length,

length the patient is unable to restore the parts to their natural situation, the piles mortify and drop off, and then the bowel retires, leaving the patient considerably relieved from the difficulty and pain attendant on the expulsion of the fæces. The editor of Mr. Pott's work says, that Mr. Pott was remarkably successful in removing hæmorrhoidal excrescences, by ligature* ; in some cases such means may doubtless be proper; yet it has appeared to me, that tying hæmorrhoidal excrescences is productive of all that temporary distress which is observable in what I have termed their natural cure; and as there is a general disorder in the functions of the alimentary canal in all such cases, the irritation occasioned by the ligature aggravates this habitual disorder, and produces sometimes very alarming symptoms.

With these facts before me, I was led to examine the structure of those piles which had been removed by a ligature, or which I

* See Sir James Earl's edition of Mr. Pott's Works
vol. iii.

accidentally met with in the dead subject; and I found them to be merely fleshy substances, possessing no vessels of considerable size, nor such as should deter us from cutting the excrescences away. It is now twenty years since I first began to remove them freely with the knife or scissars, and I have never met with any circumstance to deter me, whilst the relief of suffering, which the operation has afforded to some, and the scarcely to be expected, and complete cure which it has effected in many, has been highly gratifying. Piles have been supposed to be owing to a dilatation of the hæmorrhoidal veins, and that these veins are sometimes enlarged, is evident from anatomical examination, and from cases which occasionally occur in practice. In a recent attack of an hæmorrhoidal affection, something occasionally protrudes from the anus, which when punctured emits a continued stream of blood, as a vein does when opened. When the blood ceases to flow the protruding part should be replaced, and maintained in its natural situation.

The origin and formation of internal piles, is, I think, similar to those which are external. When from irritation about the rectum, an external pile forms, a swelling suddenly occurs beneath the thin skin, near the verge of the anus, and the part is heated and painful. If the skin be divided, the swelling is found to be caused by effused blood; and if the clot be removed, there is no stream of blood emitted as from a vein. If the wound be small, blood again collects beneath the skin, and the swelling is reproduced. If the bowels be regulated, so that the state of irritation, which is the cause of these productions, be mitigated or removed, and if the slightly painful and heated swelling be cooled by evaporating washes, the effused blood is frequently absorbed, and the distended skin appears loose and pendulous. On the contrary, if the irritation continues from there being some permanent disease on the inside of the bowel, then the effused blood becomes an organized substance, and a permanent external pile is formed. The orifice of the anus is often surrounded by tumours of this kind, which, however, do
not

not require to be removed, and are only indicative of internal irritation. In like manner blood is effused beneath the bowel just above the sphincter, and forms an internal pile. If it be divided, coagulated blood may be removed from beneath it, with the same events as occur in external piles. The effused blood is sometimes absorbed, and the pile disappears; but, more generally, it becomes an organized substance, and increasing in bulk, whilst others also form, they are productive of those inconveniences that have been represented.

Though the everſion of the bowel may, in many caſes, be attributed to the efforts made to overcome the mechanical reſiſtance, which theſe tumours oppoſe to the expulſion of the fæces; yet the everſion is not, in general, to be ſolely attributed to this cauſe. It ariſes alſo from an irritable and ſtriving action of the bowel, which produces a kind of intuſſuſception. Thus plaits of the bowel often deſcend in an irritable action of the part during the expulſion of the fæces. I have known many caſes of the following deſcription. A perſon having ſome diſorder
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of the bowels, and having an urgent call to void the fæces, has suffered afterwards great pain for a number of hours. The next evacuation has been attended with similar consequences, and thus the patients have continued for a considerable time, ignorant of the cause of their sufferings. On introducing the finger, I have distinctly felt, and fairly replaced a fold of the bowel, and the patient has been immediately relieved from all uneasiness; and by repeating the same act, when required, and keeping the bowels regular by a mixture of castor oil and mucilage, with cinnamon water, they have suffered no uneasiness subsequent to the alvine discharges, and in a short time this faulty action of the bowel has entirely ceased. But if a patient remains ignorant of the cause of his sufferings, and does not adopt this mode of relieving them, the fold of the bowel becomes irritated and thickened by the pressure of the sphincter muscle; it enlarges and becomes in form adapted to this unnatural situation, and thus we often meet with folds of the bowel forming hæmorrhoidal tumours. When a pile, or any hæmorrhoidal

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dal tumour becomes inflamed and swollen, it has a tendency to draw down more of the bowel, and increase the disease.

The eversion of the bowel thus produced from hæmorrhoidal affections, must be considered as a different case from that procidentia or prolapsus ani, which takes place independently of such affections, and it is to the treatment of the former only that this paper relates.

In the first volume of these observations, I have mentioned, that to me, all kinds of irritation inducing local diseases in the lower parts of the bowel, appear to be the effects of a general disorder in the functions of the alimentary canal; and that the correction of the general affection is essential to the cure of the local disease. If the bowels can be got to regularly carry down and discharge the residue of the food once in twenty-four hours, the straining from costiveness, and that irritable and repeated action attendant on purging, both of which must be injurious to the local disease, will cease to aggravate it. The patient

patient should bathe and anoint the protruded parts with ointment, and carefully replace them above the gripe of the sphincter. Under these circumstances hæmorrhoidal tumours, and the procidentia ani often become of so little inconvenience, as not to induce a patient to wish for a more radical relief.

But, if from the magnitude or number of these hæmorrhoidal tumours, such an opposition should be created to the expulsion of the fæces, that the bowel is forced down at every attempt to discharge them ; if from the inflamed and ulcerated state of hæmorrhoidal tumours, they keep up an irritable action of the parts tending to maintain and aggravate the disease, then an operation seems to be required.

I shall now describe, in the briefest manner possible, the treatment and mode of operating which I have found most successful in these diseases. First, it seems essential, prior to undertaking any operation, to get the bowels into the habit of regularly evacuating the refuse matter of the food daily, and the liver

regularly

regularly secreting a due proportion of healthy bile. 2dly, The bowels ought to be perfectly cleared before the operation; and this may be accomplished, by giving to the patient such a dose of medicine as has been found, by experience, to be likely to answer this purpose without inducing a continuance of irritation and purging. The bowel being everted to the utmost by the efforts used in evacuating the fæces, and the parts cleansed by bathing with tepid water, the piles should be taken hold of by a double hook, of a breadth corresponding to the length of the pile, and when drawn upwards from the bowel, it may be removed by a pair of scissars. A protruded and thickened plait of the bowel may be seized in the same way; but I think it is better to use the bistoury in removing it, because the depth to which the scissars may cut is uncertain. The incision made by the knife resembles two curved lines joined at each extremity. The length of the incision should, both for the removal of piles and that of plaits in the bowel, be longitudinal, in the direction of the bowel.

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If, therefore, there be a transverse fold of the bowel of considerable extent, I think it best to take away two elliptical portions in the long axis of the rectum, rather than attempt more completely to remove it by a wound made in another direction.

The hæmorrhoidal tumours being removed, the wounds should be suffered to bleed as long as they are disposed to do so, and afterwards the parts should be completely replaced by means of the finger, previously anointed. As irritation is a principal cause of hæmorrhage from the small vessels, and as that is likely to be occasioned by any part of the bowel being lodged within the gripe of the sphincter, and compressed by that muscle, this part of the operation should be particularly attended to. The patient should now be speedily placed in an horizontal position, the nates should be exposed, and the parts surrounding the anus should be frequently bathed with cold water, to check inflammation and consequent hæmorrhage.

Frequently

Frequently from the apprehension of the vexation and trouble of a subsequent hæmorrhage, the surgeon is desirous, after an operation, of tying every vessel that could possibly pour forth blood; yet after the patient is put to bed, and becomes warm, particularly if there be any circumstance causing local irritation in the wounded parts, hæmorrhage even to a considerable degree ensues. The wound is opened and bathed, and often no vessel is discovered bleeding, or requiring a ligature. Diminishing the temperature of parts is one of the most potent means which we possess of lessening inflammatory action, and this seems to be best accomplished by the continual evaporation which is going on when parts are frequently wetted. Formerly I met with much trouble from hæmorrhage, particularly on account of the blood effused into the rectum, creating an uncontrollable propensity to discharge it per anum; and in this act the wounded parts became again protruded and injured. Since, however, I adopted the mode of treatment which I have described, I have witnessed no inconvenience of this kind. In general, the patients feel

very comfortable, and the anus seems as if there were no disease. When the parts have been for some time tranquil, and the risk of hæmorrhage has ceased, the parts need no longer to be bathed or exposed.

The patient should be restricted in his diet : the food should be of the most nutritive quality, and such as is likely to leave the least residue, but the quantity should be as small as possible, because it is an object to keep the restored parts undisturbed for as long a time as possible. If the opening medicine, which has been given with a view to clear the bowels, before the operation, should be likely to affect them afterwards, some opium may be administered to prevent it.

Under these circumstances, I have known patients lie for eight or ten days undisturbed, and during that time the wounds, it is probable, had nearly, if not entirely, healed, as the subsequent discharges from the bowels were effected without hæmorrhage, or the descent of any part. However, as these patients have a disordered state of the digestive organs,

organs, sensations seemingly requiring some alvine discharges for their relief, will induce us to give some opening medicine long before that period. Experience in the case of our patient should have previously taught us, by what dose of medicine we might calculate, with some degree of certainty, to procure one sufficient and lax motion, which should be parted with by the patient with as little effort as possible. It is better that the patient should not attempt to evacuate the contents of his bowels till his sensations become urgent. When a sufficient discharge has taken place, if any thing has descended, it ought to be carefully replaced as it was after the operation. A small dose of laudanum may be given to stop any further effect from the purgative medicine. Now, though such operations, conducted on the plan which I have described, have been productive of the beneficial effects which I have represented in the beginning, it is wrong to promise too much to patients in general, because the irritable and disordered state of the digestive organs, which is habitual, and which has produced the disease may keep up a disor-

dered state of rectum afterwards, and occasion new diseases to form of the same nature.

On Fistulæ in the Perinæum.

Towards the conclusion of the second part or volume of these observations, when speaking of the effects of diseases of the urethra, I had designed to insert a chapter explanatory of some circumstances relative to those abscesses and diseases, which frequently take place, and lay the foundation for fistulæ in perinæo. In consequence of my being much hurried by business at that time, it was omitted, yet thinking that its publication may be useful, I insert it at the conclusion of the present volume.

It is well known, that abscesses form in the vicinity of the urethra, when it is in an irritable state, but there are some circumstances relative to their progress, which perhaps have not been generally or sufficiently attended

attended to. When matter forms in the course of the membranous part of the urethra, or in the neighbourhood of the bulb, it does not produce inflammation of the skin, or break like a common abscess; on the contrary, the skin is but little affected, and as the matter increases in quantity, it appears kept down as if it were collected beneath a fascia. Under these circumstances it in general comes forwards, in the course of the spongy substance of the urethra, and bulges out in the middle of the scrotum, forming there a tense protuberant swelling. I have sometimes known the matter make its way backwards, and present itself between the thigh and buttock, a little below the rectum. These circumstances indicate, that there is a fascia spread beneath the skin of the perinæum, over the subjacent parts; yet, I think, the limits of this fascia can scarcely be ascertained by dissection.

The knowledge of its existence appears to me of importance in explaining many occurrences which take place about these parts, though its density and strength varying

in different persons, the facts which I am endeavouring to represent will vary in degree in different cases.

The abscesses of which I am speaking are often simple, no urine having escaped from the urethra to give rise to them, though sometimes after they have been opened, urine is found to pass through the cavity of the abscess in a greater or less degree.

These abscesses ought of course to be treated as collections of matter beneath fasciæ in general; they should be opened at an early period, to prevent their enlargement. A free opening is proper, because the skin being only slightly diseased, and having a great propensity to heal, will sometimes prevent the free escape of any matter or urine, which may be in the cavity of the abscess. The cavity will then become distended and enlarged, perhaps in a direction between the rectum and the thigh, requiring another opening to be made in that situation: yet, in general, I have not found it necessary to divide the skin throughout the whole front of the abscess.

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The complicated sinuses, which form in some cases of fistulæ in perinæo, do not appear to me to arise from such simple cases, but from the urethra ulcerating in many parts. Anatomical examination has shewn this to be fact in several cases which I have inspected.

The ulceration, or giving way of the urethra, is, I think, generally understood to be the consequence of a stricture affording so complete an obstacle to the passage of the urine, as to occasion the canal to inflame, ulcerate, or slough above the impediment. It is very evident that this is not unfrequently the case, yet I do not believe that surgeons in general, are sufficiently impressed with the knowledge of the following fact, that the urethra may ulcerate in various parts from irritation, even whilst there is a sufficient channel for the free exit of the urine. The following cases are related in proof of this fact:

CASE.

A gentleman had been attended for a typhoid fever for between a fortnight and three

weeks. A clyster was ordered for him; but the person who was desired to administer it, could not readily introduce the pipe; and, on examination, it was discovered that there was a considerable induration, discolouration, and swelling of one buttock, by the side of the anus. On this account I was desired to see the patient, and the appearance of the part instantly induced me to say, that some urine had escaped from its natural channel, and caused the inflammation which had been productive of these peculiar appearances. The powers of the patient's mind were weak and wandering; yet, when I asked him in a loud voice, whether he had any difficulty in voiding his urine? he replied, Oh, I told you, it was my first grievance. Yet I saw him void his urine freely, and in a moderate-sized stream. Perceiving that there was fluid beneath the thickened and discoloured integuments, I divided them, and discharged a considerable quantity of putrid matter, urine, and sloughs. The patient became, for a time, much better, and urine pass'd freely through the wound; yet he afterwards gradually sunk, and died. In this case,

case, the urine must have escaped from its natural channel very high up, and have been forced into the cellular substance connecting the bladder and the rectum, producing that peculiar inflammation, which probably occasioned the typhoid fever.

CASE.

A similar occurrence happened to a patient whom I had previously attended on account of strictures in his urethra, and which had been so far relieved, that a moderate-sized bougie could be passed into the bladder, and he voided his urine freely in a moderate-sized stream. He had for some months discontinued the use of bougies previously to the event which I am going to relate. He was seized with a kind of low fever, but his attention seemed to be directed to the seat of his disease, so that it became remarked at an early period, that the integuments of the buttock, by the side of the rectum were inflamed. The similarity of this case to the preceding one induced me to make an incision through the skin and subjacent substance to some depth, when a considerable quantity of fœtid matter and urine gushed

out. I saw this patient void his urine, which he did with apparent freedom, and in such a stream as I have described. He was relieved by having an outlet given to the urine and matter, which continued to pass freely through the wound; yet he afterwards gradually sunk, and died. To my great regret, I was prevented from examining the parts after death, in both of these cases.

CASE.

A patient who had suffered for more than a fortnight with slow fever, in which his intellects were so impaired, that he communicated no information to his medical attendant respecting the nature of his disorder, was observed to have a swelling near his left groin, which was supposed to be a common abscess. This disease increasing, and shewing no tendency to break, after a few days, I was desired to see the patient. The swelling then was as large as an orange, but oblong, extending from the groin down the front of the scrotum. The colour and induration of the skin, in such cases, are in general so peculiar, as at once to impress the opinion, that effused urine has been the cause of the inflammation.

inflammation and abscess. I without hesitation cut through the thickened integuments, and discharged about six ounces of putrid pus and urine. A quantity of sloughy cellular substance soon afterwards protruded through the wound, which gradually separated and came away. The patient's intellects soon became clear, all fever left him, and he soon regained his usual state of health. In this case, I conclude, that the urethra had given way on its left side, in front of the fascia, which covers and binds down the parts beneath the skin of the perinæum, and in the vicinity of the abscess. I mention this opinion to lead us to form a probable conjecture as to the cause of the urine becoming diffused, in some cases, beneath the integuments of the pubes and abdomen.

When circumscribed abscesses form, it is probable, that the quantity of urine which escapes from the urethra is small, and that by its irritation it occasions adhesion of the surrounding cellular substance. In the case just related, the quantity must have been sufficient to have occasioned the death of a considerable quantity of cellular substance.

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When the urine is diffused, and injected into the cellular substance extensively, scarifications afford but an ineffectual outlet to it. The practice most appropriate to these cases would be, at as early a period as possible, to make a wound down to the aperture in the urethra, so that whatever urine may escape from the canal should run freely out of the wound, and be no longer forced to pervade the cellular substance. Yet it is difficult, nay, perhaps in some cases impossible, to know where the urethra has given way; and one object which I had in view in relating these cases, was to induce others to reflect, and to endeavour to ascertain, by experience, how and where we ought in different cases, to make such wounds as will afford free discharge to the urine, and prevent the horrible effects of its becoming extensively diffused through the cellular substance. Our conjectures respecting the situation of the aperture, will be much assisted by the history of the case. If the swelling and inflammation began at the top of the scrotum, near the pubes, it is probable, that the diseased aperture of the urethra is in front of the perinæum; if it began
on

on one side, it is probable, that the opening of the urethra is on that side. Were surgeons fully aware of the nature and urgency of the case, and bold enough to do what is required of them; that is, to cut through the swollen and inflamed parts, till they exposed the tube of the urethra, I am convinced many lives might be saved. If the integuments of the perinæum be affected, it is probable, that the aperture in the urethra is as far, or farther back than that part; yet respecting this point we may err, it frequently happening that the aperture in the urethra is far back, and yet the integuments of the perinæum may contain no urine, the fascia, which I have spoken of, preventing that fluid from affecting them.

I shall briefly relate two more cases to exhibit other varieties of these diseases.

CASE.

A gentleman, who was more than seventy years of age, but of a strong constitution, who had never found any difficulty in voiding his urine till a few days before the occurrence, which I am about to relate, and who
actually

actually did void it freely in a full stream, after his urethra had given way, so as to allow of the escape of a considerable portion of the urine, was suddenly seized with shivering and severe indisposition. The patient did not complain of any thing being wrong about the scrotum, or urinary organs, till about two days, when he mentioned that his testicles were swollen. When I saw him, the scrotum and integuments of the penis were much distended and mortified on the surface in several large irregular black patches. The distension of the scrotum was not merely occasioned by urine, it was emphysematous also from air extricated by putrefaction. The integuments of the perinæum were scarcely affected. The patient said that the swelling had begun from behind, and on the left side. I concluded, that in this case, the urethra had given way in the perinæum, and that the urine had passed in the course of that canal, between it and the fascia, which I have spoken of, till it arrived at the loose cellular substance of the scrotum which it readily pervaded. I know this to have been the fact in some similar cases

which I examined after death; and I conclude it to be owing to the resistance of a fascia spread beneath the skin, that the integuments of the perinæum are not affected, even though the urethra has given way beneath them. As the object of surgery is to make an external wound opposite to the orifice in the urethra, I pursued a practice in this case which I had found successful in several others of a similar nature, and which I was led to adopt, from discovering that the aperture in the urethra was, in some cases which I examined, much farther back than the part where the urine first appeared to have pervaded the cellular substance of the scrotum. I made a wound about two inches and a half in length, through the integuments and subjacent cellular substance of the perinæum and back part of the scrotum, in the direction of the urethra, but more to the left side. The wound need not extend farther back than the bulb, and should, I think, come forwards so as to divide the integuments of the back part of the scrotum, where the swelling first takes place. The object of this wound is to lay bare the fascia of the perinæum,
and

and the operator may now feel the groove which intervenes between the spongy substance of the urethra and the crus penis. Now, in cases of this description, I have proceeded to divide the fascia, which is spread over these parts, so that I could more distinctly pass my finger into the groove which is formed between them, and gently elevate the fascia from off the spongy substance of the urethra. I did so in the present case, and was anxious that the patient should void his urine, that I might see if it came through the wound which I had made, but he was unable at that time to discharge any. However, afterwards when he made water, it continued to pass freely through the wound in the perinæum.

Having formerly been perplexed with regard to such cases as I have last described, and having now operated in many similar instances, with the same event; that is, with a perfectly free discharge being afforded to the urine which escapes from its natural channel, I thought it might be useful to publish one of them, and I will add another
of

of a different kind, to shew the necessity and propriety of our endeavouring at once to give a free discharge to the urine, by making an external wound, which communicates with the aperture in the urethra.

CASE.

A gentleman of seventy years of age, was affected with a kind of intermittent fever, for which he was attended by a physician, from whom he concealed that he had any disease of his urethra. After some weeks, however, the patient informed him one morning, that he had a slight swelling of one testis. On this account I was desired to see the patient, who resided a little way from London. The swelling of the scrotum at that time was not larger than a large apple; it was situated at the back part of the bag, and on the right side, and its appearance was very demonstrative of its nature; I urged the patient, but in vain, to permit me to divide the skin, but he said he would allow no operation to be done, unless in consequence of the opinion of other surgeons in consultation.

I found that he had for the greater part of his life been in the frequent habit of passing bougies for himself, and that he was uncertain of his ability to introduce even a very small one. As no consultation could be held on his case, till the following day, I called on the patient in the evening, taking with me an extremely small flexible varnished catheter, hoping that I might be able to pass it, or if I should fail, that I might be allowed to give a free exit to the effused urine. At that time, however, I found the whole scrotum uniformly distended to a very great size, and the integuments of the penis so swollen and projecting, that it was impossible, without an operation, to discover the orifice of the urethra. The patient having appointed other surgeons to attend on the subsequent day, was resolved to abide the result of their opinion, before he would submit to any wound being made. On the ensuing day, several large irregular mortified patches had formed on the integuments of the scrotum and penis, and the patient was so sunk and confused in his intellects, that an operation was, I believe, deemed useless by all present, except myself.

myself. I knew the patient was in other respects healthy, and I had many times seen the whole skin flough off from the genitals, and the patients survive and do well. As, however, an operation was the only resource, it was performed. We drew the patients legs and thighs out of bed, and turning him on his face, the perinæum presented itself in such a manner as to admit of my performing the operation. The integuments of the perinæum were now greatly swollen, which circumstance I had not observed before. I made a wound in the direction of the one made in lithotomy, and cut through between two and three inches of cellular substance œdematous with urine, before I could touch the bulb of the urethra, or other parts situated beneath them. I raised the tumid integuments from off the subjacent parts with my finger, but still no urine flowed. I then endeavoured to pass my finger by the side of the bulb towards the prostate, in the direction of the urethra; and in a few seconds, about three pints (as I should guess) of highly putrid urine, mixed with purulent matter, was suddenly and forcibly projected. Being now

I assured

assured that the bladder could readily discharge the urine through the external wound, I cleansed and dressed the parts. The patient got into his bed without assistance, and expressed, with vivacity, all that comfort and relief which every one experiences from the evacuation of a much distended bladder. The mortified patches of skin separated, yet sufficient remained to give a covering to the genitals. Great quantities of mortified cellular substance came through the apertures left by separation of the superficial floughs. I was able to introduce a very fine elastic catheter, and by enlarging its size, weekly, the urethra regained its natural calibre in all its parts; so that the patient voided his urine in a larger stream, and with more freedom and force than he had done for fifty preceding years. It seems right however to add, that after two years, the stream having again diminished he had recourse to bougies, and met with opposition from the strictures which had contracted again during that interval.

A
TREATISE
ON
HERNIA.

A
TREATISE
ON
HERNIA:

BEING
The Essay,

WHICH GAINED THE PRIZE OFFERED BY THE ROYAL COLLEGE OF
SURGEONS IN THE YEAR 1806.

ILLUSTRATED WITH PLATES.

BY
WILLIAM LAWRENCE,

MEMBER OF THAT COLLEGE;
AND DEMONSTRATOR OF ANATOMY AT ST. BARTHOLOMEW'S
HOSPITAL.

“ Tout praticien peut à la vérité remarquer quelques faits extraordinaires, acquérir par l'exercice de son art quelques connoissances intéressantes, inventer quelques moyens particuliers dont on n'a point encore parlé; et ce sont ces mêmes nouveautés qui enrichissent peu-à-peu l'art de guérir. Mais cette expérience propre à chacun n'est qu'un point, en comparaison de l'expérience générale qui s'est formée par le concours des découvertes et des observations qui nous ont été transmises par une multitude de praticiens qui ont vécu en différens tems et en différens lieux.” HEVIN in the *Mémoires de l'Acad. Roy. de Chirurgie*, tom. I. p. 560.

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1807.

TO

JOHN ABERNETHY, Esq. F. R. S.

TEACHER OF ANATOMY AND SURGERY, ASSISTANT
SURGEON TO ST. BARTHOLOMEW'S HOSPITAL,
HONORARY MEMBER OF THE ROYAL MEDICAL
SOCIETY OF EDINBURGH, &c. &c.

DEAR SIR,

I embrace, with great pleasure, the opportunity afforded me, by the publication of the present work, of publicly acknowledging the kind advice and valuable instruction which I received from you, in the direction of my professional education ; and the friendly and liberal behaviour, which I constantly experienced under your roof. To these motives, which are of a private and personal nature, I will take the liberty of

adding the public considerations which induce me to prefix your name to these pages. I allude to the numerous and well-known improvements, for which the Science of Surgery is indebted to your genius and industry, and to the very honourable and independent principles, which regulate your conduct in the practice of a truly useful and liberal profession. With unalterable sentiments of respect and esteem for your public and private character,

I remain,

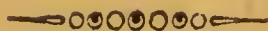
Dear Sir,

Your obliged and

Most faithful Servant,

WILLIAM LAWRENCE.

P R E F A C E.



THE subject of Hernia affords a more extensive field of discussion than any other single affection that occurs within the surgical department of the healing art. The numerous situations in which ruptures may occur, the variety of their contents, and the very different states in which the contained parts are found, occasion so many modifications of the description and treatment of the complaint, that a consideration of the subject in all it's details, instead of furnishing an essay of the length, which custom

has prescribed on such occasions, as that which gave rise to the present work, would afford ample matter for a large volume. Hence it cannot have been in the contemplation of the College, that the competitors for their prize should exhibit a complete history of Hernia. The general description of the symptoms and progress of the complaint is given with sufficient accuracy in most systematic writers, and the valuable works of POTT and RICHTER* have so exhausted the subject, that I shall be readily excused for passing it over as briefly as possible. The treatise of Mr. POTT is moreover so particularly distinguished by that lucid arrangement, accurate description, and elegant style, which adorn all his writings, that a person, who should take up the subject

* *Von den Brüchen*, 2 vol. 8vo. Göttingen, 1778 and 1779. A French translation of this work has been published at Bonn, in 1 vol. 4to. under the title of *Traité des Hernies de Mr. A. G. Richter*, by ROUGEMONT, the professor of anatomy and surgery at that place.

after him, would, besides losing his labour, expose himself to the risk of a degrading comparison.

The College have pointed out, as the particular object of their prize essay, what will be allowed by every one to be the most important part of the subject; viz. The Treatment of Hernia. On this therefore I shall enter at large. I propose also to consider, at some length, the anatomy of the parts concerned in inguinal and femoral hernia, because these points have been generally passed over very lightly in surgical books, and have received, only of late, that share of attention, which their great importance entitles them to. This plan excludes the consideration of the more rare species of ruptures, which, indeed, fall so seldom under the observation of an individual, that he would be obliged to recur, for his description, to the writings of others; and it will justify me in omitting entirely, or con-

sidering very cursorily, such points as do not demand a more detailed discussion.

The copiousness of the subject, and the necessity of confining the work within certain limits, induced me to compress the observations, which I had the honour of submitting to the College last year, into as small a compass as possible, and to pass over many points in entire silence. As the same motive of restraint does not exist on the present occasion, I have enlarged the original essay, so as to exhibit a view of every thing, which I consider it necessary for the surgeon to be acquainted with, concerning the four most frequent species of the complaint; viz. the *Inguinal*, *Crural*, *Umbilical*, and *Congenital* Ruptures.

As it seems to me, to be an indispensable part of such a plan, to notice the labours of preceding writers, and to make use of the facts which they have recorded, I think it unnecessary to offer any apology for the

quotations which appear in the following pages. The view which a surgical writer would give of any subject, from his own observation only, must necessarily be partial and confined : it will be corrected and improved by comparing it with the result of general experience. I doubt, indeed, whether it would be possible for a person, well-acquainted with the writings of others, to give an account of any extensive surgical subject entirely uninfluenced by the facts or reasonings contained in their works : I think it certain, if he could accomplish this object, that the utility of his labours would be much diminished.

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TREATISE ON HERNIA.

CHAPTER I.

DESCRIPTION OF HERNIA — CAUSES — SYMPTOMS OF THE COMPLAINT IN ITS VARIOUS STATES — PROGNOSIS, &c.

IF there be any disorder, which, from the frequency of its occurrence, and from the variety of forms, under which it is presented to the care of the surgeon, demands more than others his most minute and attentive investigation, in every part of its history and treatment; such, assuredly, is that which forms the subject of the following pages. Surgeons of great experience in the treatment of ruptures have estimated, that one-

eighth, or one-sixteenth of the human race is afflicted with this complaint; which affects, indiscriminately, persons of both sexes, of every age, condition, and mode of life.

It is true, indeed, that a hernia, if properly managed, is not immediately dangerous to the patient; does not affect his health, nor materially diminish his enjoyments: but it is a source of constant danger, since any violent exercise or sudden exertion may bring it from a perfectly harmless state into a condition, which very frequently proves fatal.

The numerous situations in which ruptures may occur, the disorders with which they may be confounded, the very different states in which their contents exist, and the minute anatomical knowledge required in operating on them, bestow a peculiar importance on the subject, and require to be studied with the most anxious interest by every man, who wishes to practise his profession with honor to himself, and advantage to his patient.

SECTION I.

General Description of Hernia, and Enumeration of the most important Species.

THE passage of any of the abdominal viscera, from the cavity in which they are naturally contained, into a preternatural bag, formed by the protrusion of the peritoneum, constitutes a *hernia*, or *rupture*, according to the most common acceptation of these terms. The protruded portion of the peritoneum is called the *hernial sac*. For the more particular description of this part, which is a subject of great importance, I refer the reader to the chapter on the anatomy of inguinal hernia.

A hernia generally causes an external tumour, which is named, either according to its situation in the body, or from the parts which it contains. The groin, scrotum, labia pudendi, bend of the thigh, and navel, are the most frequent seats of these swell-

lings; the omentum and intestines their most common contents.

When the protruded viscera have descended through the abdominal ring, without passing further than the groin; or when they are contained in the labium of the female, the case is called a *bubonocèle*, or *inguinal hernia*: when they have passed into the scrotum, it is termed an *oscheocèle*, or *scrotal rupture*; and if they are in contact with the testis, it is distinguished by the epithet *congenital*. The *crural*, or *femoral hernia*, is that which takes place under Paupart's ligament; and the *exomphalos*, or *umbilical rupture* occurs at the navel.

The names *enterocèle* and *epiplocèle*, which are equivalent to *intestinal* and *omental rupture*, are employed according as the swelling contains intestine or omentum alone: where both these parts are found in the same tumour, it forms an *entero-epiplocèle*.

These, which are by far the most frequent forms of the complaint, are all that I propose to treat of in the present Work.

So long as the viscera descend and return freely, the complaint is said to be in a *reducible* state. When, after long residence

in the tumour, they have either increased so much in bulk, or have contracted such adhesions to each other, or to the hernial sac, as to become incapable of being returned, although they experience no pressure from the ring, it is termed *irreducible*. An incapacity of reduction, arising from stricture in the opening through which the viscera have descended, brings the disease into the *strangulated* or *incarcerated* state.

SECT. II.

Causes of Hernia.

THE causes of herniæ may be referred in general to two divisions, according as they appear to operate by increasing the pressure of the viscera, or by diminishing the resistance of the abdominal parietes. The former may be ranked, in a systematic arrangement of the subject, as *occasional* or *exciting*; the latter as *predisposing* causes of the complaint.

Alternate contractions of the diaphragm and abdominal muscles are among the chief

agents in the important function of respiration. The gentle pressure, which the viscera constantly receive from this source, becomes greatly augmented by any unusual exertion, which is always attended with a forcible action of both these powers at the same time. When such efforts are carried beyond a certain point, the parietes of the cavity give way to the impelling power, at those parts where they are weakened by the holes for the transmission of blood vessels, and the viscera are thrust forth from their situation, carrying before them a portion of the peritoneum, which forms the hernial sac. Thus it is that ruptures are frequently produced by the act of lifting or carrying a heavy weight, in running or jumping; in short, under any circumstances where the strength is forcibly exerted. On this principle we can account for the observation concerning the greater frequency of ruptures among the inhabitants of mountainous countries;* with whom opportuni-

* BLUMENBACH has observed this with respect to the Swiss, and to the inhabitants of the Alps in general.

RICHTER, *Chirurgische Bibliothek*. b. 8.

ties must frequently occur of exerting their strength and activity.

Other causes, referrible to the same head, arise from the forcible action of the respiratory muscles in the expulsion of the contents of the viscera. Vomiting, straining at stool, and the act of parturition often produce ruptures. In strictured patients I have seen herniæ formed gradually in consequence of the habitual efforts required for the evacuation of the bladder. Crying is a frequent source of the complaint in children.

The predisposing cause of ruptures has been referred to a naturally greater size of the openings at which they protrude; to a weakness and relaxation of the margins of these apertures; and to a preternatural laxity of the peritoneum. The former circumstance has probably a chief operation; since in males, where the abdominal ring is naturally capacious, inguinal herniæ occur in a very large proportion, while the femoral species is very rare; females on the contrary, having the capacities of these apertures reversed, are seldom affected with inguinal ruptures. Without, however, at-

tempting to decide what is the true reason, it may be safely asserted, that particular subjects manifest an unquestionable disposition to the complaint. In such persons a very slight occasional cause, such as the act of coughing or sneezing, will bring on a rupture; the complaint, indeed, appears sometimes spontaneously. “ I know,” says Richter,* “ a savant, who leads a sedentary life, and in whom an inguinal hernia appeared suddenly some time ago. I applied a bandage, and in a few weeks a similar hernia came on the opposite side; a bandage was applied to this also; and in a very short time a crural hernia made its appearance. I have seen several similar cases; and have known four or even five herniæ come in the same subject, without the least occasional cause.”

When it is stated that hernia has sometimes appeared to be hereditary, the meaning of the observation must be, that there is a certain weakness in the original formation of the parts, predisposing to the com-

* *Traité des Hernies*, p. 9.

plaint, and that this defect may descend to the offspring; and in this sense its truth cannot be disputed. I believe that the word *hereditary*, in its application to disease, has been always used according to this interpretation; and that the employment of it in its strict sense has only been suggested by those, who wished to shew their ingenuity in refuting an absurdity of their own creation.

The dilatation of the openings, through which herniæ take place, in consequence of the distention of the abdominal parietes during pregnancy, accounts for the greater frequency of ruptures in general, and of the exomphalos in particular, in women who have borne children.

The ruptures which appear after debilitating diseases, and those which occur in persons, who, from a state of corpulency, become suddenly emaciated, must be referred to weakness.

CASE.

A friend of mine met with a remarkable instance of the latter kind in a French emigrant. The danger, anxiety, and fatigue which this unfortunate gentleman experienced in escaping from his native country, and the extreme indigence, to which he found himself reduced on his arrival in England, reduced him from the embonpoint, which the luxurious table of affluence had produced, to a state of considerable emaciation; and a hernia took place at each groin.

We are sometimes unable to determine what is the direct cause of the rupture; as, where it happens in consequence of a blow, from the agitation of a rough cart, or violent horse exercise. The latter circumstance has certainly a decided influence in producing the complaint; for cavalry are found to be ruptured in a much greater proportion than foot soldiers.

It would be useless to make a point of enumerating every trivial circumstance which may occasionally contribute to the formation of a rupture. The general view, which I have already given, will enable the reader to understand the subject sufficiently. I shall just observe, that some of the causes, assigned by systematic writers, are totally inadequate and even ridiculous. In the respectable work of RICHTER, which deserves on the whole much commendation, the origin of herniæ is attributed to the use of relaxing and aqueous liquors, of fat and oily kinds of food; to moisture of the climate, &c.

Herniæ, which originate in predisposition, generally come on gradually, and almost imperceptibly; while those, which are produced by bodily exertion, are formed suddenly, and by the immediate action of the exciting cause. The occurrence of the complaint is often indicated in the first instance by a fulness, combined with a sense of weakness about the abdominal ring. The swelling is increased by any action of the respiratory muscles, and disappears on pres-

sure, and in the recumbent position of the body. It gradually finds its way through the tendon of the external oblique muscle into the groin, and afterwards into the scrotum. When a hernia takes place suddenly, it is generally attended with a sensation of something giving way at the part, and with pain.

SECT. III.

Symptoms of reducible Hernia.

WHEN the contents of a rupture experience no pressure from the margins of the opening, through which they have descended, their functions are little, if at all impeded; the description of the disease consists therefore chiefly in an enumeration of the sensible characters of the tumour. When, on the contrary, the hernia is strangulated, the natural offices of the protruded parts are entirely obstructed; hence various dangerous and alarming symptoms ensue, by which the character of the complaint is completely changed.

If we meet, in any of the usual seats of herniæ, with an indolent tumour, which has arisen under the circumstances generally attending the formation of this complaint, we naturally ascribe its origin to a protrusion of the abdominal viscera. Our suspicion is converted into certainty, if we find that the swelling varies in size; being smaller in the recumbent position, larger in the erect posture, or when the patient holds his breath; diminishing, or entirely disappearing by means of pressure, and enlarging again when this pressure has ceased; if it be large and tense after a meal, or when the patient is troubled with wind, soft and small in the morning, before he has taken any food; if, since the commencement of the complaint he has been troubled with any affections, arising from the unnatural situation of the viscera, as colic, constipation or vomiting; if he perceive occasionally a rumbling sensation in the tumour, particularly on its return; and lastly, if it become tense when he coughs, so that an impulse is communicated to the hand of the examiner.

The symptoms of the case will generally point out the nature of the contained parts. If the surface of the tumour be uniform; if it be elastic to the touch; if it become tense and enlarged when the patient is troubled with wind, coughs, or holds his breath; if the part return with a peculiar noise, and pass through the opening at once, the contents of the swelling are intestine. If the tumour be compressible; if it feel flabby, and uneven on the surface; if it be free from tension, under the circumstances just enumerated; if it return without any noise, and pass up very gradually, the case may be considered an epiplocele.

The circumstances, which have been just enumerated, characterize the complaint so perfectly, that no doubt can exist as to its nature; there can be no fear of confounding it with other disorders, if we advert to their origin, progress, and symptoms. The nature of the case is more doubtful, if the swelling be small and deeply seated; if it has arisen gradually; if it be connected with other tumours; if it contain much fluid, and the patient be fat. Here the greatest attention

and discernment are required on the part of the surgeon; his opinion must be guided rather by the symptoms, than by the characters of the tumour.

A reducible hernia, though attended with no immediate danger, occasions great inconvenience to the patient, particularly if it be allowed to increase unrestrained by surgical treatment. The portion of intestine or omentum, which has left the abdomen, produces various complaints from its connexion with the parts within. From this source of irritation proceed nausea and vomiting, indigestion and colic. As the viscera become accustomed to their unnatural situation, these inconveniences gradually wear away. Still, as the tumour constantly increases in size, a large part of the viscera is deprived of that pressure and support, which they naturally derive from the respiratory muscles; the passage of the food through the alimentary canal becomes difficult and protracted; and hence large ruptures are almost invariably attended with flatulence and constipation. The opening,

through which the viscera pass out, must subject them to more or less pressure; which will enable us to account for that effusion of fluid into the cavity of the sac, which is generally observed in old ruptures; and for the formation of those adhesions of the parts to each other, and to the hernial sac, which change the case from a reducible swelling, to one which will no longer admit of reduction.

SECT. IV.

Symptoms of strangulated Hernia.

THE first and most immediate effects of such a degree of pressure, as prevents the return of the protruded parts, are an obstruction to the passage of the intestinal contents, and consequent want of fecal evacuations; and a more or less violent inflammation in the strangulated part. The former symptom will often occur to as great a degree, and will be equally insuperable by purgative medicines, where a portion only

of the diameter of the gut is strangulated,* as where a complete fold of intestine is included: it even happens occasionally in a mere epiplocele, where no intestine at all is protruded. Hence it must be referred rather to that inflammatory affection of the intestines, which subsists in this complaint, than to the mechanical obstruction of the canal; and must be considered as analogous to the constipation, which prevails in ileus when produced by other causes. The inflammation of the protruded viscera causes an effusion of fluid into the hernial sac, and adhesions of the parts to each other, and to the containing bag. When it is particularly violent, a layer of coagulable lymph is sometimes thrown out on the surface of the intestine. It terminates at last, unless the stricture be previously removed, in gangrene. These, which we may call the *primary* effects of the incarceration, are accompanied by other symptoms, arising from disorder

* *Mémoires de l'Académie de Chirurgie*, tom. III. p. 151.—
London Med. Obs. and Enquiries, vol. IV. p. 178 and 355.

of the parts, which sympathise with the hernia.

In an incarcerated intestinal rupture, the tumour, which was before indolent, becomes painful; the pain is most acute at the strictured portion, and extends from that situation over the rest of the swelling and abdomen; these parts becoming at the same time swoln and tense. The evacuations per anum are entirely suppressed, and nausea and vomiting ensue: all the contents of the stomach, and afterwards those of the intestines, down to the stricture, being rejected. These symptoms, which often remit for a considerable period, are accompanied by a proportionate derangement of the whole system. There is great anxiety and restlessness, with a small and hard pulse, and coldness of the extremities: after a time hiccough supervenes, the pulse becomes so small as to be hardly sensible, the respiration is weak, and the whole body is covered by a cold and clammy sweat. Mortification now takes place; it begins in the contents of the rupture and extends to the containing and neighbouring parts. The degree

and intensity of the symptoms are modified by various circumstances, as the age and strength of the patient, the nature of the strangulation, &c. The duration of the complaint, from its first commencement, to the termination in mortification or death, is also extremely various.

An epiplocele is much less liable to strangulation, than an intestinal rupture, and its symptoms are milder and slower in their progress. In this variety of the complaint, stools may generally be procured by purgative medicines or glysters. The connexion of the omentum with the stomach induces hiccough and sickness, and although the latter symptom seldom proceeds to stercoraceous vomiting, it exists to a most distressing degree, and particularly characterizes the complaint. The symptoms are often influenced by the position of of the body, being mitigated by bending, and aggravated by straightening the trunk. An epiplocele is occasionally accompanied with all the dangerous and alarming symptoms of an intestinal rupture, as insuperable constipation, fecal vomiting, &c.

The examination of a patient, who dies while labouring under a strangulated hernia, discloses such a state of parts as the symptoms just enumerated would naturally lead us to expect. The whole surface of the peritoneum is inflamed, and the intestines participate in this disorder, particularly that portion of the canal, which is above the stricture, which is distended considerably beyond its natural diameter. The convolutions of the intestinal canal are agglutinated by a recent deposition of coagulating lymph; streaks of a bright red colour, consisting of an aggregation of minute vessels, cross the intestines in different directions; and spots of gangrene are not unfrequently observed. All these circumstances shew us most decidedly that the effects caused by strangulation are of the most active inflammatory kind. We must regard the stricture, which the protruded parts experience, as the immediate cause of this disorder.

The symptoms of an incarcerated hernia being those, which attend inflammation of the intestine, it becomes, in all cases, a ne-

cessary and important part of the surgeon's duty to discriminate carefully the cause of such affections. Whenever we see a patient labouring under the symptoms above described, we should suspect the existence of a rupture, and make those inquiries and examinations, which such a suspicion would naturally suggest: when, on the contrary, we know that the patient has a rupture, but find that the swelling is free from pain and tension, and has been so from the beginning of the complaint; and more especially if it admit of reduction, we may with reason ascribe his symptoms to a different origin. Wherever there is room for any doubt as to the nature of the case, an attentive examination of the symptoms; of their mode of accession, nature, and duration; and of the history of the complaint, can scarcely fail to afford sufficient information for the direction of our conduct.

SECT. V.

Different Species of Strangulation.

Systematic writers have distinguished the causes of incarceration, as consisting either in a diminished capacity of the opening, or in the intrusion of additional parts into the aperture. The absurdity of this distinction is manifest on the most superficial consideration; since it is very obvious, that the presence of either of these circumstances implies relatively that of the other. A more important distinction arises from the nature and general symptoms of the case; in compliance with which, we discriminate between the acute or inflammatory, and the chronic or slow kinds of strangulation. This indeed is highly useful, as it comprehends the characteristic marks of two very different cases, and leads to practical discrimination in their treatment.

The inflammatory strangulation occurs in young and strong patients; in cases, where

a rupture is formed suddenly by a great bodily exertion; or where, after having been kept up by a truss for a long time, it is suddenly reproduced by any cause of the same description. It is mostly confined to small herniæ, or to such at least as are of a moderate size. Under the circumstances just enumerated, the opening, through which the viscera protrude, is small: the pressure on the protruded parts must consequently be great; and hence, in great measure, arises the peculiar character of the case. The symptoms come on suddenly, and their progress is rapid: the swelling is tense and highly painful, particularly at the ring, where the slightest pressure is intolerable: the abdomen quickly becomes painful, and is tense and elastic to the feel: the constitutional affection partakes of the inflammatory character. So quickly does the complaint run through its stages in this case, that gangrene has been known to occur in twenty four* hours from the expulsion of the intestine.

* WILMER'S *Practical Observations on Herniæ*, p. 74.—
POTT'S *Treatise on Ruptures*, in his works, vol. II. p. 94, edi-

The slow strangulation takes place in large and old herniæ, which have been often protruded and replaced. The contained intestines are probably rendered somewhat indolent in performing their functions; as patients of this kind are habitually subject to costiveness and intestinal complaints. The contents of the alimentary canal will easily accumulate and be retained in a situation, where they enter the intestine without difficulty, but have their egress obstructed by the force of gravity. The strangulation arising from such an accumulation constitutes the case, which has been

tion of 1783. The latter writer mentions another instance, in which a bubonocoele terminated fatally in less than a day. (ibid. p. 85) Mr. HAY has twice seen patients die of hernia within twenty-four hours.—(*Practical Observations*, p. 142.) In a case alluded to by Mr. COOPER, eight hours only elapsed between the occurrence of strangulation and the patient's death.—(*Anatomy and Surgical Treatment of Inguinal and Congenital Herniæ*, p. 26. The same author also gives an instance of umbilical hernia, in which the progress to a fatal termination was remarkably rapid. The symptoms were of the most acute and violent description: death happened in seventeen hours and a half after strangulation began; and the integuments had already mortified at one part of the swelling. (*Anatomy and Surgical Treatment of Crural and Umbilical Hernia*, p. 45.)

termed by a French writer* “hernie par engouement des matières.” The rupture swells slowly, and becomes heavy and hard. The abdomen enlarges from the accumulation of the intestinal contents above the stricture. After some days the swelling becomes painful, and the patient grows feverish: but the fever is not considerable, neither are the abdomen or tumour ever so painful and tense, as in the former species of incarceration. In some cases of this description, a fortnight has elapsed without any considerable morbid alteration having taken place in the protruded parts. LE DRAN† operated on the sixteenth day without finding the contents of the swelling much altered from their natural appearance; and SAVIARD‡ did the operation with complete success on the twenty-second day from the commencement of the incarceration.

The differences observable in the two

* See a memoir by Mr. GOURSAUD; “sur la différence des causes de l’étranglement des hernies,” in the *Mémoires de l’Acad. de Chir.* tom. IV.

† *Observations de Chirurgie*—Obs. 57.

‡ *Nouveau Recueil d’Obs. Chirurg.* Obs. 20, p. 112.

very opposite cases which I have just described, admit of an easy explanation. In the first, the close pressure of the ring on the prolapsed parts, in a subject prone to inflammation, causes immediately a violent inflammatory derangement of the abdominal viscera. The accumulation of feces, on the other hand, where the parts and the constitution are in a torpid condition, gives to the disorder the characters of a merely mechanical obstruction.

As the description is drawn from the most strongly marked cases, we shall seldom find the difference between the two kinds of strangulation so clearly expressed. The symptoms indeed are often of such a mixed and indefinite nature, that they might be arranged without impropriety under either of the above species.

To the two kinds of strangulation, which I have now described, RICHTER has added a third, under the epithet of *spasmodic*, which he considers to arise from the action of the external oblique muscle. It does not seem to me that this case is sufficiently characterized, nor that any practical benefit

can be derived from the distinction. The following passage will shew what symptoms this author considers as peculiarly denoting the existence of spasm: “ La
 “ respiration courte et froide, le ventre
 “ tendu, gonflé, et cependant peu doulou-
 “ reux, le froid, et la paleur de la mort,
 “ qu’on remarque au visage, aux extrémi-
 “ tés; l’anxiété, l’agitation, le vomissement,
 “ le hocquet, le pouls petit et serré ne sont
 “ ils pas des preuves manifestes d’une ma-
 “ ladie spasmodique? et ces symptômes
 “ paroissent souvent dans les premières mo-
 “ mens de l’étranglement.”* If these are the symptoms of a spasmodic stricture, every rupture which happens may be classed under this description.

Some other rare kinds of strangulation have been noticed by surgical authors. It has been produced by preternatural adhesions of the parts, by a fissure in the omentum;† by various foreign bodies, which had been previously swallowed;‡ by worms, &c.

* *Traité des Hernies*, p. 53.

† *Acta Havniensia* vol. I.

‡ RICHTER, *Tr. des Hernies*, p. 47.

None of these causes could be ascertained previously to an operation, or to the patient's death, and are therefore of no practical importance.

SECT. VI.

Prognosis of strangulated Hernia.

IN a case of strangulated hernia, our prognosis will be influenced by the cause of the rupture, by the nature of the incarceration, by the size, situation, and contents of the swelling, and by the age and constitution of the patient.

A large and old rupture, which seems most formidable on the first view, is in reality attended with much less danger than a small and recent one; and it is more difficult to effect the replacement of a rupture of the latter than of the former description.

“ I think (says Mr. Hey) it is not a bad
“ general rule, that the smaller the hernia,
“ the less hope there is of reducing it by
“ the taxis. Long-continued efforts to re-

“ duce a prolapsed intestine are most likely
“ to succeed in old and large hernias, when
“ no adhesions have taken place.”*

An old rupture is not readily strangulated, and when it falls into this state the danger is not imminent; the distention of the opening, previous to incarceration, has so dilated and weakened the parts, that they can no longer produce a close constriction. In a small and recent case, the dimensions of the aperture are unimpaired, and its sides are unyielding: strangulation takes place easily, and the degree of stricture is always considerable.

The danger is greatest, when a rupture is incarcerated at the moment of its formation. Herniæ, which arise spontaneously, and, as it seems, merely from predisposing weakness, seldom become strangulated: the stricture, in such cases, is never close, nor are the symptoms violent, because the parts concerned are weak and relaxed.

The opening, through which the parts protrude, is narrower in some situations

* *Practical Obs.* p. 203.

than in others; the progress of the case will therefore be more rapid, and the danger of the patient more urgent. The aperture is generally very small in femoral hernia: this kind of rupture in men, and the bubonocoele in women have a particularly narrow entrance.

An enterocele is much more hazardous to the patient than an omental rupture; for the parts are more sensible, and the due performance of their functions is more essential to the support of life: a strangulated epiplocele is indeed seldom fatal.

In persons of a robust constitution, and of the adult period of life, the symptoms will partake of the inflammatory character; the ruptures of old subjects are generally of long standing, which, together with the diminished powers of their system, bestows on the complaint a more languid form. Although the herniæ of infants are very rarely strangulated, they are not entirely exempt from this occurrence. Mr. POTT* saw a child of one year old die of incarce-

* *Works*, vol. II. p. 33.

rated rupture ; and GOOCH* has recorded an instance, which proceeded even to mortification in an infant of ten weeks.

CASE.

I lately witnessed a successful operation for scrotal hernia, at St. Bartholomew's hospital in a child fourteen months of age. This case, which was under the care of Mr. LONG, afforded an exception to the general rule mentioned by Mr. POTTER† “ that all
“ those ruptures, which appear in the scro-
“ tum of very young children are conge-
“ nial.” The parts had descended to the bottom of the scrotum, but were not contained in the tunica vaginalis testis. All the usual means of reduction had been attempted ineffectually, before the operation was resorted to; the contents of the tumour consisted of a portion of large intestine; the sac was very thin, and, though adherent to

* *Surgery*, vol. II. p. 203.

† *Works*, Vol. II. p. 22.

the surrounding parts, mistaken at first, as it frequently is, for the intestine: the great closeness of the stricture rendered the division of the tendon a matter of some difficulty. The crying of the child forced the gut frequently through the wound in the progress of the cure; but the parts being supported by sticking plaister, gradually healed. The rupture descended again in a short time.

CHAP. II.

TREATMENT OF REDUCIBLE HERNIA.

THE treatment of a reducible rupture comprehends the return of the protruded parts, and their retention within the abdominal cavity by means of an appropriate truss. The necessary observations concerning the mode of replacing ruptures will be delivered when the treatment of strangulated hernia is considered.

So long as the protruded viscera can be made to pass freely into the abdomen, this complaint carries with it no immediate danger to the patient. It may indeed be troublesome, both from the bulk of the swelling, and from the intestinal derangements, which the residence of the viscera in their unnatural situation is apt to create; but, independently of these circumstances, it may exist throughout life, without caus-

ing more than slight inconvenience. This innocent state of the disorder cannot, however, be at all depended on; as numerous accidental causes may at any time bring it into a condition, where the life of the patient is exposed to the greatest risk. A trifling bodily exertion, by forcing down an additional quantity of the bowels, an excess in eating or drinking, an indigestion or any intestinal disorder may convert the rupture from a reducible to an incarcerated state. Should the patient escape this fate, the unrestrained increase of the swelling constitutes a sure source of future inconvenience and disease. The vast size, to which neglected herniæ sometimes increase, not only prohibits all active exertion; but, by involving, in the male, the integuments of the penis, incapacitates the subject from the act of copulation, and gives rise to excoriation from the discharge of the urine over the swelling. Disorders of the intestinal functions invariably attend these large ruptures, and increase in frequency and violence in proportion to the size of the swelling, and age of the patient.

These considerations should render every person, afflicted with a rupture, anxious to get the parts replaced, and to have a proper truss applied; and they should lead surgeons to inculcate the necessity of these measures, as forcibly as they can, on the minds of all such as seek relief from their advice.

As modern practitioners are universally agreed in the propriety of trusting to the use of trusses only, as a means of obviating the danger and inconvenience which a rupture may produce; and as the various methods proposed, I will not say employed, by the older surgeons, with the view of preventing the return of the complaint, would expose the patient's life to the most imminent risk, without affording any greater chance of an effectual cure than the use of trusses would bestow; we may allow the operations devised for the purpose of a radical cure to descend quietly into oblivion, without wasting our time in the description or consideration of them.

Construction and Use of Trusses.

Herniary bandages are of two kinds, the elastic and non-elastic: we can trust to the former only for accomplishing our object; they keep up an uniform pressure under every variation of circumstances, and are in all points of view so vastly superior to the latter, that these have fallen almost completely into disuse.

The most important part of an elastic truss consists of a flat and narrow piece of steel, adapted to the form of the body, and called the *spring*. This passes round the affected side of the trunk, terminates anteriorly in an expanded plate placed over the mouth of the sac, and extends behind to various distances beyond the spine. The posterior surface of the plate is furnished with a convex cushion termed the *pad*, and adapted in form and size to the opening, which it is designed to close. The spring is covered externally with leather, and that it may set easily on the body, its inner sur-

face is lined with some soft substance ; a strong strap extending from its posterior end passes round the sound side of the trunk, and is fastened to a hook on the front of the plate.

A patient, who is ruptured on both sides of the body, must have a spring extending round the back and sides of the pelvis, and terminating anteriorly in two plates, each of which is furnished with a cushion for the hernia of its own side. A strap, sewed to one plate, and attached to a hook on the opposite side, serves to connect these together. A double truss is sometimes made with two distinct springs, but it does not possess the stability of the former kind. The distance between the two openings must be carefully marked in taking the measure for a double truss, and accurately observed by the maker in executing his instrument.

When in inguinal or crural ruptures the pad rises higher than its proper situation, the truss receives the addition of a thigh-strap, which passes from the back of the spring under the affected thigh, and is at-

tached to the plate by means of a hook. The inconvenience arising from the opposite defect, in which the pad sinks too low, must be remedied by a band going over the shoulders: we may sometimes accomplish our object, without making any addition to the truss, by merely changing the position of the hook to which the strap of the truss is fastened: when the pad rises too high, this hook should be placed towards the lower part of the plate, and vice versa.

The measure for a truss is taken by passing a string round the body, from the point at which the viscera are found to protrude, in that situation which it is intended that the instrument should occupy. In order to obtain a more exact representation of the form of the trunk, it is proposed to take the measure with a double flexible wire, which may be bent exactly to the form of the parts. In either case the alteration, made by covering the spring, requires that an inch should be allowed beyond the measure.

In order that a ruptured person may derive all the benefit which a truss can afford,

and avoid as much as possible the inconveniences connected with its use ; care should be taken, that the spring be constructed of a due strength ; that the instrument set close to the body in every part, so as not to make any partial or irregular pressure ; that it be not deranged by the necessary motions of the body ; and that the form of the pad be adapted to the part on which it lies. When the measure has been properly taken, much must depend on the execution of the artist ; yet attention on the part of the surgeon may often detect the source of inconvenience.

The strength of the pressure will be in proportion to the thickness and breadth of the spring. Small ruptures, and those, which occur in children, or in persons who do not lead a laborious life, and are not obliged to make great exertions, may be retained by a weaker truss than is required for cases of the opposite description. As the omentum escapes from the abdomen much more readily than the intestines, an epiplocele requires a proportionally stronger spring than an intestinal rupture. When

the hernia is large and old, or the subject of it is exposed to the necessity of frequent laborious exertions, a strong truss is required. The patient should on no account wear a more powerful spring than his rupture requires, since the long-continued pressure of the pad must have the effect of weakening and injuring the abdominal ring and surrounding parts. If the pad is too convex, the pressure is confined to one spot, at the side of which a protrusion may occur. When the case requires so strong a spring that the pressure on the spermatic chord is painful, the pad may be constructed with a hollow to admit this part. A similar contrivance may be found useful when rupture is combined with disease of the testis or spermatic chord.

The form of the spring, and consequently the position which it occupies at the side of the pelvis, is a point of the greatest importance in obviating the possibility of a derangement from the motions of the trunk or hip. Sometimes it is carried horizontally round from the pad; and then it goes so near to the trochanter major as to be very

easily displaced by the motions of the thigh. To avoid this defect, it has been brought midway between the crista of the ilium and the trochanter ; but the same inconvenience exists in a diminished degree.

A truss has been constructed by Mr. Whitford, surgeon's instrument maker near St. Bartholomew's Hospital, different from any which I have hitherto seen in the form and course of the spring, and possessing apparently all the firmness and stability, which can be bestowed on these instruments.* The spring passes on the ruptured side just below the outer edge of the crista of the ilium, as far as the posterior superior spinous process of that bone. It then goes straight across to the same point of the opposite bone, and pursues its course, on the sound side of the pelvis, in the same relation to the crista ilii as it held on the side of the rupture, as far as the anterior superior spinous process, where it terminates as usual in a leathern strap. In this mode of construction the motions of the trunk and thigh cannot de-

* The figures annexed to this work represent the spring separately, and the complete truss, as adapted to the body.

range the instrument, which acquires a still further stability from the extension of the spring round the sound side of the pelvis. I have not seen enough of the actual employment of this truss to speak very decidedly on the subject. I know that it has answered the expectations of the inventor in some cases, where the common trusses had been found inconvenient and insufficient; and I think it therefore an act of justice both to him and to the public to notice it on the present occasion, that it may be employed in a greater number of instances, and that its merits may be appreciated according to the result of these trials.

Trusses are sometimes fabricated with a pad moveable on a rack, so that its position can be changed according to the form of the abdomen. In others the plate contains a screw, by which the cushion is pushed further inward, or allowed to recede at pleasure. A simple instrument, when well made, answers every end which can be accomplished by these more complicated ones, and is therefore preferable to them for reasons which must be obvious.

A compress of folded calico, placed under the pad, and renewed daily, preserves the truss from the effects of perspiration; and certainly in many instances increases the beneficial operation of the instrument, although we cannot explain the principles on which this effect is produced.

The pad of the truss should be placed over the opening, at which the viscera have protruded: hence, in a small, or recently formed inguinal rupture, the proper position for it is considerably exterior to the pubis, and rather above that bone. The surgeon must, in all cases, endeavour to ascertain the precise point at which the rupture has taken place, and that is the right position for the pad. When he is going to apply the truss, he will place it round the pelvis, and put his patient into the recumbent position. Having carefully replaced the whole protrusion, he presses on the opening with one hand, and with the other applies the pad of the truss in its proper situation, holding it there, until he has adjusted the rest of the instrument, and fastened the strap to the plate. The patient will

follow the same plan in applying the instrument himself; and the most convenient time for this purpose is before he rises, as the viscera generally re-enter the abdomen during night, and have no disposition to descend again until he assumes the erect position.

The use of an elastic truss, not only keeps the viscera within the abdominal cavity, and thereby protects the ruptured person from all the dangers, to which the existence of his complaint would otherwise expose him; but, if continued for a sufficient length of time, even affords a prospect of a radical cure. The constant pressure of the pad keeps the neck of the sac empty, and this part, together with the surrounding tendinous opening contracts, in obedience to the general law, by which all hollow parts of the body adapt themselves to their contents. Sometimes the truss excites a kind of slow inflammation, which produces an actual agglutination of the sides of the aperture.

In proportion, as the patient is younger, may we more reasonably expect a radical cure from the use of the truss. We may in-

deed speak with confidence on this point in the ruptures of children. Although cures sometimes take place in adults, they cannot be regarded as matters of frequent occurrence; and they are not at all to be expected in old subjects.

Some practitioners are inclined to prohibit the use of a steel truss in infants, but there is no foundation for this exception, and the instrument may be employed with perfect safety in the youngest persons. No benefit can be derived from the employment of a non-elastic bandage, which is sometimes used in infants; and we may lay down a general rule, that the chance of a permanent cure is greater, the sooner we begin to employ the steel truss. The resistance in these cases is but weak, and a strong spring would therefore be not only injurious but useless.

A small and recent hernia, which has been produced by some accidental exertion, affords the most favourable prospect of a radical cure from the application of a truss; which, on the contrary, offers nothing more than palliation in large and old ruptures,

and those whose origin may be referred to predisposition.

The truss must be worn without intermission by a person who hopes that its employment may cause such a contraction of the ring and sac, as will prevent any future descent of the viscera. The same rule should indeed be observed by all, who are obliged to wear these instruments. It would be better indeed that no truss should ever be used, than for the patient, after wearing one for some time, to lay it aside suddenly: for a hernia reproduced under these circumstances is much exposed to the occurrence of strangulation, and such an incarceration is particularly dangerous. If however the parts should not be strictured, their protrusion dilates the sac and ring, which had begun to contract, and destroys the benefit already derived; the cure therefore commences again from this period. The inconvenience and restraint, occasioned by the first application of the instrument, induce us to allow the patient to sleep without it for a short time; enjoining him not to remove it before he has lain down in bed,

and to re-apply it before he rises. This practice must be discontinued as soon as the patient's feelings will admit of it; and the constant wearing of the truss must then be strictly enforced. He should have at least two trusses, and will find it pleasant to change them in the morning. When the covering is much worn, or rendered irritating by the perspiration which it imbibes, it should be immediately renewed.

When this plan of treatment has effected a radical cure, it may be laid aside; but prudent caution requires that the patient should be fully convinced of his cure before he discontinues the bandage; and he will do well to leave it off gradually, first at night and afterwards in the day time, avoiding all violent exertions which might cause a fresh protrusion.

It must be allowed, after all, that trusses of the best construction, and most judicious application will not always prove a certain defence against a protrusion. Various accidental circumstances may derange the instrument, and a portion of intestine, or more particularly of omentum may slip out

under the pad. For this reason bodily exertion should be avoided as much as possible; and the patient, when obliged to make any exertion, should press on the pad with his hand. If a protrusion should occur, let him immediately take off the truss, lie down, and either return the part himself, or send for his surgical attendant.

CHAP. III.

TREATMENT OF IRREDUCIBLE HERNIA.

THE reduction of a rupture may be impracticable, although the protruded parts suffer no strangulation. Adhesion of the prolapsed viscera to each other, and to the sac, is sufficient to produce this effect; and it probably occurs in some instances, where reduction is not prevented by any obstacle of this kind, but only by the enlargement of the protruded parts. As the application of a truss in these cases is out of the question, the tumour must be supported by means of a suspensory bandage.

Surgical observers* have recorded several cases, in which large, old, and irreducible ruptures, in consequence of long confinement to bed, have returned completely into

* FAB. HILDANUS, cent. 5, obs. 54.—POTT's *Works*, vol. II. p. 73.

the cavity of the abdomen. It has been proposed to imitate this operation of nature by the efforts of art, and the attempt has, in some instances, been attended with success. By confining the patient to bed, by restricting him to a light and sparing diet, and by the employment of venesection, calomel, purgatives, and glysters, ARNAUD* accomplished the replacement of a vast scrotal rupture, which had existed from infancy; and succeeded in numerous herniæ which resisted every other method. His assertions on this subject are corroborated by the testimony of LE DRAN† who witnessed the progress of many of his cases. The same plan has been successful in several instances in the practice of Mr. HEY.‡

This treatment must induce a general state of weakness and relaxation, particularly favourable to the return of the protruded parts: it must also operate powerfully, by causing the absorption of accumulated fat,

* ARNAUD on *Hernias*, p. 292. Also his *Mémoires de Chirurgie*, tom. II.

† *Traité des Operations*, p. 114.

‡ *Practical Obs.* p. 219.

in reducing the bulk of the hernial contents. For the latter reason we should expect it to be particularly successful in such ruptures as consist for the most part of omentum; and the recorded experience on this subject justifies our conclusion. In combination with the measures above described, considerable assistance may be derived from keeping up a constant pressure on the tumour by means of a suspensory bandage made to lace in front, and diminished in size according as the contents of the swelling recede.* When the reduction of the tumour has been effected, it must be kept up by the application of a truss. In some instances, where the parts have been returned, the ultimate success of the plan has been frustrated by an unexpected occurrence. The parietes of the abdomen have become so far adapted to the diminished quantity of the viscera, that the sudden introduction of a large additional bulk could not be borne. A patient, who persisted

* PETIT recommends for this purpose trusses with hollow pads; proposing to fill up the cavity, as the parts recede.—*Traité des Malad. Chirurg.* tom. II. p. 335, et seq.

for a long time, under the direction of SCHMUCKER,* in keeping the parts reduced, was brought into a state of the greatest extremity, which absolutely compelled him to remove the truss. This gentleman has seen many instances of the same kind: PETIT has even known the practice to prove fatal: the application of the truss after reduction caused nausea and vomiting, and other distressing symptoms, which rendered its removal necessary, yet the hernia did not come down again, nor did the symptoms cease; and the patient died, as it appeared upon dissection, of inflammation of the peritoneum.†

In the case of an irreducible omental hernia of moderate size, a truss with a hollow pad may be recommended, but an enterocele will not bear this treatment.

Mr. COOPER has accomplished the reduction of herniæ, in some instances, after the previous application of ice to the swelling.

A person, who has a hernia incapable of

* *Chirurgische Wahrnehmungen*, vol. II. p. 243.

† *Loco citato*, p. 392.

reduction, is exposed to much greater danger than the subject of a reducible rupture. Strangulation may take place at any time, in consequence of some straining or exertion; and complaints arising from affection of the intestinal canal make their appearance on the slightest exciting cause: hence it is particularly incumbent on patients of this description, to avoid all unusual efforts; and, by a strict attention to diet and the state of the fecal discharge, to keep the alimentary canal, as nearly as possible, in a healthy condition. Costiveness should be particularly guarded against.

Irreducible herniæ must of course be exposed to all the consequences of external injury and violence; hence, various cases are recorded, in which the bowels have been burst by blows, falls, &c.

CHAP. IV.

TREATMENT OF STRANGULATED HERNIA.

THE indication of cure in incarcerated hernia, is to liberate the parts from stricture, and to replace them in their natural situation.* The treatment of the complaint, when examined in detail, will appear more complicated than this view of the subject would lead us to expect; for, as

* The propriety of establishing this, and this only, as the indication of cure for strangulated hernia, is so striking and obvious, that it would have been almost unnecessary to notice it here, had not RICHTER and CALLISEN, two of the most celebrated modern surgeons, represented the matter in a different light. The objects of surgical treatment in this disorder, according to these writers, are to obviate inflammation; to subdue spasm; to procure evacuations; and lastly, to replace the rupture: thus they combat the effect while the cause continues to operate. The last is the only rational indication, and its accomplishment necessarily includes the attainment of the other objects.—See RICHTER *Anfangsgründe der Wundarzneykunst*, vol. V. p. 238. CALLISEN *Systema Chirurgiæ Hodiernæ*, pars posterior, p. 464.

persons of every age and constitution, and of all ranks and conditions of life, are subject to the disorder, the means of accomplishing the general indication must be modified by these circumstances: hence we find that various methods of treatment have been proposed, which, though very different, and sometimes almost opposite to each other, may yet be all of them eligible in particular cases: their respective merits may in general be estimated by the degree in which they contribute to the accomplishment of the above-mentioned object.

The principal means, which have been adopted for the cure of strangulated hernia, are, bleeding; the warm bath; purgative medicines by the mouth, and in the form of glyster; injections of the decoction or smoke of tobacco; opiates and other antispasmodics; the cold bath, and various cold and warm applications to the part. The works of surgical writers afford numerous instances, in which all these methods have been successful; and the practice of most individuals would furnish similar results. But the recital of single cases tends,

as Mr. HEY has well observed, to advance our knowledge very little: our object should be to ascertain the comparative merits of each mode, and to deduce from thence general rules of practice. With this view I shall consider separately what is to be said on the subject of each of the above-mentioned methods.

SECT. I.

The Taxis.

WHEN a surgeon is called to a case of hernia, he attempts, in the first instance, to replace the protruded parts; which operation is technically termed the *taxis*. When the swelling is free from stricture, this replacement is generally very easy; but when the parts are more closely girt, the operation is rendered proportionally difficult, and requires that attention should be paid to the position of the body, and to other circumstances, which may influence the chance of success. The patient should lie down when

we attempt the taxis, as many circumstances prove that the recumbent position contributes materially to the return of the prolapsed parts. When the rupture is of the inguinal or crural kind, the pelvis should be placed higher than the shoulders, so that the swelling itself may constitute the most elevated point of the trunk. The patient's bladder should be previously emptied; and he must carefully abstain from coughing, holding his breath, or any similar efforts. These precautions procure us as much room as possible in the abdominal cavity, and favour the return of the protruded parts, as far as that object can be effected, by the force of gravity.

The position of the patient must also be regulated with a view to the opening, through which the parts have descended. Hence, in inguinal and crural hernia, the thigh should be bent, and rolled inwards; in order to relax the tendon of the external oblique muscle. It is also recommended to elevate the shoulders slightly, as well as the pelvis. This brings the trunk into a curved

state, and completely relaxes the abdominal muscles.

When things are thus prepared, the surgeon begins his attempt by a gentle pressure on the tumour, which may be gradually increased, but should not be carried to such an extent as to cause pain:* violence cannot indeed be beneficial, as it is more likely to press the parts in a mass against the ring, than to urge them through the opening. We usually grasp the tumour with one hand, while the other is placed at the aperture, where it may be employed in facilitating the entrance of the parts, and in keeping up those which have been already returned. Success will often be obtained by exerting a general pressure on the whole surface of the swelling; in which method, both hands must be employed in order to subject the entire tumour to the action of the force. This method is strongly recommended by PETIT.†

* The intestine has been burst by the employment of too great force in the attempts at reduction.—COOPER'S *Anatomy, &c. of Inguinal Hernia*, p. 23. See also J. L. PETIT *Traité des Maladies Chirurgicales*, tom. II. p. 322.

† *Loco citato*, p. 323—328.

The pressure should be exerted according to the course in which the parts have been protruded: thus, the contents of a bubonocèle pass obliquely downwards and inwards; those of a femoral rupture downwards and then forwards; yet we should not confine ourselves entirely to such a kind of pressure as the course of the hernia would suggest; but, in failure of those attempts, make other trials in different directions.

The following manœuvre will sometimes succeed in a bubonocèle or scrotal hernia, after the more ordinary methods have failed, particularly in cases, where the strangulation seems to have been caused by an accumulation of fecal matter. Let the surgeon embrace the neck of the swelling, close to the tendon, with the finger and thumb of one hand, and carry them downwards, with a moderate pressure, so as to remove the contents from the portion next to the ring; this will reduce the size of that part, which he may then attempt to pass into the ring with the other hand.

The surgeon should place himself in a

situation which he can occupy without inconvenience for a considerable time, since he must persist in his attempts for an hour in some cases, before he gives up the expectation of success; and it often happens that, by perseverance in trying various positions and modes of pressure, herniæ are ultimately replaced, which did not yield at all to the first attempts.

If the efforts at reduction, managed according to the above directions, are not attended with success, the following method has been recommended. A strong man placed in a convenient position near the edge of the bed, supports the lower extremities on his shoulders, so that the patient's head and chest only rest on the bed. Attempts at reduction in this posture are said to have succeeded after every thing else had failed, and have therefore been highly recommended by some surgeons. I cannot fairly appreciate the merits of this proposal, as I have never adopted the practice, nor seen it employed by others. It does not seem to me to promise any advantages that could compensate for the un-

pleasantness, trouble, and inconvenience inseparably connected with its employment. The proposer of this manœuvre must have expected to accomplish reduction by the mechanical effect which the weight and dragging of the viscera in the abdomen would have on the protruded parts. That this idea is completely absurd, must be immediately perceived by any one who forms a just notion of the natural state of parts; who is aware that the abdomen is accurately full, and that all its contents are preserved in their relative positions by the pressure of the respiratory muscles; that they cannot therefore fall from one part of the cavity to another, but are probably just in the same place, whether the head or the heels be the most elevated point of the body. Reduction is opposed by the pressure which the protruded parts experience, and this position can neither overcome nor diminish that obstacle.

The return of a piece of intestine is generally preceded by a peculiar noise, caused by the passage of air through the strictured part. It recedes at first gradually, and then

slips up suddenly. The omentum goes up slowly to the very last portion, which must be actually pushed through the opening.

If the taxis should not succeed at first, it may often be successfully repeated after the use of the warm bath, bleeding, or cold applications.

The chance of returning a hernia will be proportionate to the size of the opening: hence small tumours are the most difficult of reduction, as they are always attended with the closest stricture; and this difficulty is experienced particularly in crural ruptures, from the extreme narrowness of the aperture through which their contents descend. The probability of replacement is also materially influenced by the duration of the complaint; it is much less in the later than in the earlier stages of the strangulation, from the inflammatory disorder which arises in the prolapsed parts.

When the rupture becomes painful, we are no longer justified in persevering in attempts at reduction by the hand. A sufficient pressure cannot now be endured; and the force, which is employed, only tends to

increase the inflammation, and accelerate the approach of gangrene. At this period the operation is required, and should be performed without delay.

The surgeon is not warranted in relying on the taxis as his chief method of accomplishing reduction; he should not waste in unavailing efforts of this kind, that time which ought to be devoted to the prosecution of more vigorous measures. When he cannot reduce a rupture at one fair trial, he has less and less chance of effecting this object in the subsequent progress of the case, unless he can produce an alteration in the state of the tumour by other means.

My opinion on this subject is confirmed by the experience of RICHTER, whose words I shall take the liberty of quoting.

“ Je n’ai vu que très rarement une her-
“ nie vraiment incarceration être réduite par le
“ taxis, et lorsqu’on a pu la réduire, les cir-
“ constances avoient été tellement améliorées
“ par d’autres moyens, et les parties rentre-
“ rent si facilement et si inopinément, quoi-
“ qu’on eut fait auparavant les tentatives en
“ vain, que j’ai penché toujours à croire qu’

“ elles seroient rentrées d’elles mêmes quelques heures plus tard.”*

Mr. HEY† also advises us to be cautious of doing too much, as he has seen great harm arise from long continued efforts to replace the strangulated intestine.

The opinion of RICHTER and of Mr. HEY receives the strongest confirmation from the experience and reasoning of DESSAULT.‡ Long practice had shewn that justly famous surgeon, that ruptures, in which the inflammatory symptoms are strongly marked, are seldom returned by the taxis, and that the repeated and forcible attempts at reduction§ employed before the operation, have a most

* *Traité des Hernies*, trad. par ROUGEMONT, p. 66.

† *Practical Obs.* p. 144.

‡ *Œuvres Chirurgicales de DESSAULT*, tom. II. p. 332, 338.

§ Those, who have seen much hospital practice, will recognise the justice of the following remark. “ Il en est des
“ hernies étranglées comme de l’introduction des sondes
“ dans les rétrécissemens de l’urètre; il faut, avant de re-
“ courir aux derniers moyens, que chacun se soit épuisé en
“ secours préliminaires; il faut que l’effort de tous les con-
“ sultans passe, pour ainsi dire, sur la tumeur; s’ils sont
“ nombreux, est-il possible qu’elle ne soit pas meurtrie, de-
“ chirée surtout si, comme il arrive, chacun cherche à l’envi
“ à obtenir, à force de pressions ce à quoi n’a pu réussir ce-
“ lui qui l’a précédé?”—p. 336.

decidedly unfavourable influence on the event of the case; hence he was led to proscribe the taxis in the inflammatory strangulation, until the previous use of other means had produced a change in the state of the swelling; and he justifies his conduct by the comparison of two lists of patients operated on at the Hôtel Dieu: in one of these were contained the names of patients, on whom reduction by the hand had been attempted before the operation in the usual manner; and in the other, of those, who had been operated on without such attempts.

The reader will not, I hope, conceive, that the remarks, which I have now made, are intended to convey a general disapprobation of the use of the taxis. They are applied to those cases only, in which the existence of considerable pain in the swelling and abdomen, together with other circumstances, denotes that the incarceration is of the inflammatory kind. Where the rupture is tolerably free from pain and tension, and the general character of the case

is slow and languid, a judicious use of the taxis can never be injurious.

The reduction of the rupture does not always terminate the complaint: the symptoms do not cease until the patient has had fecal evacuations, which, from the weakened and disordered state of the alimentary canal, seldom take place spontaneously. Mild purgatives and glysters are necessary to free the intestines from that load of fecal contents which irritates and oppresses them. These remedies must be occasionally repeated until the intestines have regained their healthy state: they are particularly necessary where the strangulation seems to proceed from an accumulation of matters in the canal.

The patient is also exposed to the risk of a much more dangerous occurrence; viz. inflammation of the bowels. This will be indicated by the well-known symptoms, and must be treated accordingly.

SECT. II.

Blood letting.

THE use of blood letting in strangulated hernia has been very freely adopted, and warmly recommended by the most celebrated modern surgeons. The grounds of this practice are derived from the state of inflammation which occurs sooner or later in the prolapsed parts, and which is propagated from that source over the whole abdomen. Besides its effects in curing and preventing inflammation, the state of faintness, which it produces, is said to be peculiarly favourable to reduction. Mr. POTT*,

* “ Perhaps there is no disease affecting the human body, “ in which bleeding is found more immediately and eminently serviceable than in this; and which, therefore, if “ there are no particular circumstances in the constitution “ prohibiting it, ought never to be omitted; but, on the “ contrary, should be freely and largely repeated, if it appears “ at all necessary.”—POTT’S *Works*, vol. II. p. 79. SHARP’S advice on this subject is just the same.—*Treatise on the Operations*, edit. x. p. 17.

in this country, has been the most strenuous advocate of venesection, and the high esteem in which his writings are most deservedly held has, no doubt, been a chief cause of its very general employment. RICHTER* and CALLISEN,† the authors of the most approved continental systems of surgery, have been no less forward in recommending the free and almost indiscriminate use of the lancet in this complaint. Yet the authority of these great names has not gained universal assent to their opinions. Some eminent surgeons of this country have not only doubted the utility of venesection in strangulated hernia, but have published opinions most decidedly adverse to the practice. Mr. WILMER‡ of Coventry, and Mr.

* “ Aussitôt que la hernie est douloureuse, il faut saigner, de quelque espèce que soit l'étranglement.”

RICHTER, *Traité des Hernies*, p. 93.

† “ Præcipuus vero cardo vertitur in sanguinis detractio; quæ non solum inflammationi obstat, et inde eo magis necessaria est, quo distinctiora phlogoseos symptomata adsunt, sed quoque ob citam, quam inducit, debilitatem, reductioni favet.”—CALLISEN, *Syst. Chir. Hodiern. pars poster.* § 707.

‡ See his “ *Practical Observations on Hernia, illustrated with Cases.*”

ALANSON† of Liverpool, consider bleeding as completely inefficacious in forwarding reduction: the weight of Mr. COOPER's‡ experience has been added on the same side of the question.

The degree, in which any particular mode of treatment can contribute to liberate the contents of a strangulated hernia from stricture, is the fair criterion by which its merits should be estimated. An examination of blood letting according to this rule, will not lead us to place that confidence in its powers, to which the strong recommendation of POTT, of RICHTER, and of CALLISEN would otherwise have entitled it. Venesection cannot enlarge the opening through which the hernial contents have descended; it cannot diminish the bulk of the prolapsed parts; nor has it the power of exciting any action of the viscera, which might extricate them from the stricture: yet, if it were found actually beneficial in practice, these theoretical objections might be justly disregarded; but it has gradually fallen into

* “ *Practical Observations on Hernia, illustrated with Cases.*” P. 43.

† *Anatomy &c. of Inguinal Hernia*, p. 24.

comparative disuse among the practitioners of this metropolis, from the experience of its frequent inefficacy. A means of such powerful operation as blood letting, if useless, can hardly escape the suspicion of being injurious; and such, no doubt, it must be, when indiscriminately employed in the treatment of strangulated hernia.

I would have it understood that this observation applies to the indiscriminate employment of large and repeated bleedings. As patients, who die after the operation, have generally appearances of inflammation in the abdominal contents, I am aware that the moderate use of venesection, if it does not contribute to the return of the parts, cannot be injurious on the principles above-mentioned. I think that the advocates and opponents of blood letting have stated their opinions too strongly on the opposite sides of the question, and that a judicious practitioner will take a middle course between these two extremes. He will not with POTT use venesection in all instances, neither will he follow Mr. WILMER in discarding it entirely from the treatment of hernia, but

will restrict its employment to a certain class of cases.

He will have recourse to it when the strangulation is of the inflammatory kind; when the hernia is small and recent; the abdomen tense and painful; and the patient young, strong, and plethoric. Two cases are related in the excellent Practical Observations of Mr. HEY,* which will serve to shew under what circumstances venesection is allowable. The experience of this judicious practitioner leads him to concur with Messrs. WILMER and ALANSON in declaring, that blood letting has generally failed to procure the return of a strangulated intestine, although he does not agree with them in their universal reprobation of its employment.

One advantage is certainly derived from venesection, although it should prove inadequate to the intended object of its employment; viz, that, by checking inflammation, it keeps the disorder stationary, and is therefore attended with no loss of time. It is hardly necessary for me to observe, that

* P. 124.

the conduct of the surgeon cannot be regulated in these cases by the state of the pulse; the pain and tension, and other symptoms will justify him in employing or repeating this evacuation, where the pulse is weak, and not beyond its natural frequency.

The warm bath is used with views partly analogous to those, which guide the practitioner in the employment of venesection: it induces a state of faintness and relaxation, under which reduction may be attempted with advantage. The weakness produced by this remedy is temporary, and is not attended with any subsequent debility. The use of opium may be advantageously combined with it, if the symptoms of irritation are strong. After the taxis has been unsuccessfully employed, the patient should be placed in the warm bath, if possible, in the recumbent position: when faintness comes on, the attempts at reduction may be renewed in the bath.

The warm bath may be used in the early stages of the complaint, when the symptoms are not yet very urgent. If the stran-

gulation has lasted for some time, so that the circumstances require dispatch; if it has resisted more powerful means, such as the topical application of cold and the tobacco glyster, it would be mere waste of time to employ this remedy; when indeed the strangulation is completely formed, the warm bath offers but a slight chance of producing the return of the parts.

SECT. III.

Purgatives.

PURGATIVE medicines have been recommended with the view of exciting the peristaltic action of the intestine, and thereby extricating it from the stricture. Experience has taught us to repose very little confidence in these remedies: they are not only inefficacious, but actually prejudicial in the inflammatory strangulation. They are either immediately rejected on reaching the stomach; or, if they pass into the intestines, increase the irritation, under which

the parts already labour. Hence the most approved surgical writers* of the present day prohibit their employment in cases of that description. In old and large herniæ, where an accumulation of fecal matter, from torpor of the intestine, is the cause of strangulation, and the symptoms are of the chronic kind, purgatives may be employed with success. If vomiting has come on in such a case, it may be allayed by opium and the effervescing draught, so as to allow a fair trial of the purgative. The most violent remedies of this description are not always the best in such a case. Epsom salt, dissolved in a large quantity of water, and exhibited in small and repeated doses, gently excites the action of the parts, and is preferable to the more drastic purges.

An omental hernia is another exception to the general doctrine on the subject of purgatives. If we can clear the intestines completely, the operation will be seldom necessary: bleeding, the warm bath, and fomentations to the abdomen may be use-

* POTT's *Works*, vol. II. p. 82—RICHTER *Traité des Hernies*, p. 89—HEY's *Practical Obs.* p. 128.

fully combined, in this case, with such means as will evacuate the bowels.

As the tendency to sickness may render it advisable, in such a case, to exhibit the purgative in the form of pills, the union of calomel and the cathartic extract is well adapted for the purpose: for the same reason, a combination of opium with these medicines may be serviceable.

Purgatives, in the form of glysters, do not seem more efficacious than the same remedies taken by the mouth: if the intestine below the stricture has not been already emptied, (which, however, it generally is, soon after the strangulation is formed) glysters will bring away its contents. Their exhibition in this form is not liable to the same objection, which rendered it improper to administer them by the mouth; viz. the increased irritation which they occasion. In cases, where purgatives are proper, glysters may be combined with them.

SECT. IV.

Tobacco Glyster.

GLYSTERS of tobacco constitute our most powerful and certain means of relieving incarcerated hernia, independently of the operation; and general experience has so clearly shewn their efficacy, that the knife is rarely, if ever, resorted to in the present day, without a previous trial of this remedy: yet it is not invariably successful; we can by no means assent to the observation of HEISTER,* that the use of tobacco renders the operation in all cases unnecessary. It may be employed in the form of infusion, or of smoke: in the former case one dram†

* “Posteaque adhuc aliquot ejusmodi ægros hoc fumo tabaci
“ feliciter restitui, ut nunquam adhuc hoc in morbo ad scal-
“ pellum accedere opus mihi fuerit.” *Instit. Chirurg.* p. 807.

† One dram of tobacco, boiled or infused in a pint of water, is the quantity generally recommended by English practitioners.—POTTS' *Work*, vol. III. p. 276. HEY'S *Practical Obs.* p. 140. COOPER, *Anat. &c. of Ing. Hern.* p. 24.

of the herb having been boiled for ten minutes in a pint of water, the strained liquor should be injected. The smoke is impelled into the rectum from the well-known apparatus consisting of a bellows, long pipe, &c. The effects on the patient appear to be nearly the same in both instances, and our present experience does not warrant us in ascribing a preference to either form of the remedy.*

The beneficial effects of tobacco do not depend on its purgative power, as I have already stated that purging glysters are nearly

And this is generally found sufficient to produce the desired effect. The cases quoted below from Mr. COOPER should render us cautious in exceeding this quantity: RICHTER, however, orders an ounce of tobacco to the same quantity of water.—*Anfangsgründe der Wundarzneykunst*, vol. V. p. 264. Can this difference be accounted for by the habit of smoking, which is universally prevalent in Germany?

* Mr. HEY prefers the decoction, without mentioning the grounds of his preference; p. 140. POTT and RICHTER seem to think the smoke preferable. The former states, that the smoke does not operate so powerfully on the nervous system as the decoction. The administration of the smoke is often attended with considerable trouble and inconvenience from the apparatus being damp, or out of order, so that the decoction has grown into more general use: and it must be allowed that this is the most certain way of employing the remedy.

inefficacious. It not only excites the action of the intestines, but exerts a peculiar depressing influence on the system at large; it reduces the pulse, and brings on nausea and sickness, cold sweats and fainting, under which circumstances the parts recede spontaneously, or may be returned by the slightest pressure. Its use should be continued until these effects are produced; the quantity required for this purpose varies considerably in different persons. Mr. COOPER has seen two drams, and even one dram, employed in the form of infusion, prove fatal to the patient.* In other cases, two ounces have been consumed in the smoke apparatus before the necessary effect was produced, and the case terminated favourably.† I have seen two drams of the decoction used, and two-thirds of an ounce entirely consumed in smoke in the same patient, who was fifty years of age, with the production of very slight effect: I afterwards operated in this case with complete success.

* *Anatomy, &c. of Ing. Hernia*, p. 24.

† POTTS' *Works*, vol. III. p. 277.

The tobacco has sometimes been successful in the extremest cases; a rupture was reduced by this remedy, under Mr. POTT's* direction, when every other means had failed, and the patient had been placed on the table for the operation. Similar instances of its efficacy are related by the same author. I think it worth while to add to the testimony already before the public, the following proofs of its great powers; previously observing, that I do this merely to shew what the remedy is capable of effecting, and not for the purpose of exhibiting models of the conduct, which a surgeon should pursue in such instances.

CASE I.

ALL the usual means had been employed ineffectually, in a strangulated scrotal rupture, for the space of five days. The tobacco smoke was resorted to; and, after persevering in its use for a considerable time, the tumour subsided spontaneously.

* *Works*, vol. III. p. 277.

CASE II.

IN another case, where the strangulation had lasted for a week, and the feeble pulse, fecal vomiting, pallid countenance, and oppressed breathing indicated the greatest danger, the tobacco produced its beneficial effect, and the patient recovered.

CASE III.

IN one instance, where the smoke was ultimately successful, its effect on the system at first was nearly fatal. The strangulation had existed for three days, in which time purgatives and glysters, large bleedings and cold applications had been ineffectually employed. The administration of the tobacco produced such a state of tremor and faintness as to make the attendants think the patient was dying. The pulse sunk so as to be scarcely perceptible; and the countenance bore marks of approaching dissolu-

tion; under these circumstances the stricture gave way, the parts returned, and the nervous system soon recovered from the effects of the remedy.

I shall conclude my observations on this part of the subject, by stating that the tobacco, like every other means, has often failed; but that no other remedy has been so frequently successful: and that, when this has appeared, on a fair trial, to be incapable of accomplishing our object, the only resource lies in an immediate performance of the operation.

SECT. V.

Antispasmodics.

THE utility of antispasmodics in strangulated hernia is much insisted on by RICHTER:* he includes under this denomination the warm bath, emollient fomentations to the

* *Anfangsgründe der Wundarzneykunst*, vol. V. § 322—329.

abdomen, opium, ipecacuanha in small doses, &c. Opium indeed has been often recommended, and many cases might be collected, where it should seem to have promoted the return of the prolapsed parts; but general experience does not warrant any great reliance on this remedy. It possesses, according to Mr. HEY's* observations, the power of suspending the pain and vomiting, even where it proves ultimately inefficacious. It may therefore be an useful auxiliary, under certain circumstances, although it cannot be considered as a primary means of accomplishing our object. On the use of ipecacuanha, and other antispasmodics, my own experience does not enable me to decide. I should not expect any benefit from their employment. When I am informed that the return of a hernia has been effected by means apparently so inadequate as the exhibition of two grains of opium and castoreum,† I cannot help suspecting that reduction might have been accomplished without the aid of these medicines. Not content with employing

* *Practical Observations*, p. 134, and *Case*, p. 129.

† *Richter Traité des Hernies*, p. 52.

ipécacuanha in nauseating doses, RICHTER actually speaks of giving it in such quantity as to occasion vomiting. I am exceedingly surprised to meet with such a proposal from a person of RICHTER's good sense and great experience. Surely, if vomiting is to effect the return of a strangulated hernia, we may leave the case to nature: this symptom appears speedily enough without the use of emetics.

SECT. VI.

Cold Bath, and cold Applications.

THE cold bath, and the dashing of cold water on the patient, although, perhaps, successful in a few cases,* have never pro-

* PETIT mentions a case, in which, after the regular and unsuccessful employment of the usual means of art, he had resolved on the operation, and was on the point of making his first incision; when he was stopped by the arrival of the patient's grandmother, who commanded him to desist. She had the patient placed on a blanket, and ordered a bucket of cold well water to be dashed on the thighs and abdomen; and the hernia returned almost immediately.—*Tr. des Mal. Chir.* tom. II. p. 325.

duced very decided benefit, nor been attended by such general good effect as to warrant their recommendation.

The application of cold to the hernia is entitled to more attention.* This may be accomplished by pounded ice, tied up in a bladder, and placed on the rupture. A solution of sal ammoniac, or of other salts, in cold water, may be employed in the same manner. The application of folded cloths dipped in iced water, and frequently renewed; and the evaporation of ether† upon the part, are other means of accomplishing the same object. We should persist in the trial for some hours,‡ in order to give it a fair chance: yet caution must be observed on this point; for the scrotum has been

* Mr. WILMER has been very strenuous in recommending this practice, and has related several cases of its successful employment.—See the second edition of his Tract, London, 8vo. 1802.

† Instances of the efficacy of this treatment are related in *Duncan's Commentaries*, vol. XVII. p. 487; and vol. XVIII. p. 443.

‡ If no benefit is derived in the course of four hours, we need not expect success from the further prosecution of the cold application.

frozen by the long continued application of ice.*

The topical application of cold is one of our most powerful means of treating strangulated hernia, and is to be considered as second only to the tobacco. It is somewhat difficult to explain the manner in which this remedy operates. It is supposed, by causing a constriction or corrugation of the integuments and external parts, to create a general pressure on the surface of the prolapsed viscera. It must, at the same time, by diminishing the inflammatory disorder, reduce the bulk of the swelling; and these two effects will concur in promoting the reduction. It may be combined with the use of the tobacco.

SECT. VII.

Warm Applications.

POULTICES, and fomentations both to the swelling, and abdomen, were formerly very

* COOPER, p. 25.

generally employed in the treatment of strangulated hernia; but repeated experience has so fully demonstrated their inefficacy, that no practitioner of the present day would place the least confidence in them. The constant progression of these cases from bad to worse renders it necessary, that effectual means should be resorted to in an early stage of the complaint: hence, any mode of treatment, which in itself may be harmless, becomes, from the loss of time, which it occasions, positively prejudicial.

SECT. VIII.

General Observations.

It may be expected, that these observations on the various modes of treating strangulated hernia, should be applied to cases as they actually occur; but this must be done by the surgeon in his practice. He must exert his own judgment in the selection of his means, and their adaptation to the circumstances of the case. If he is

called in the early state of the complaint, and the taxis has been unsuccessful, warm bathing and blood letting, where the circumstances admit of it, will be the first means for him to employ. I should not, however, be inclined to recommend the warm bath, unless it can be prepared expeditiously.

Cold applications to the tumour hold the next rank in the list of remedies. Should these be unsuccessful, he will give a fair trial, with as little delay as possible, to the tobacco; and, in the event of its failure, immediately operate.

The employment of venesection, glysters, and purgatives, if the stomach will bear the last-mentioned remedies, will generally relieve the distressing symptoms of an epiplocele, and preclude the necessity of having recourse to the operation. The application of leaches to the tumour affords a prospect of benefit in this case.

When, as it very frequently happens, the aid of the surgeon is not required, until the complaint has lasted for some time, a trial of the tobacco, together with the topical use of cold, should be immediately resorted to;

as circumstances will not admit of delay in the previous use of less powerful remedies. His own discernment must be trusted for adapting his means and conduct to the different circumstances of an inflammatory and a chronic case. The use of purgatives and glysters, which are beneficial in the latter, do not afford a chance of success in cases of the former description. They should never be employed, unless the slow progress of the case clearly shews that the danger is not urgent.

I wish to impress the surgeon with the propriety of giving, without delay, an adequate trial to the most powerful means which the art affords, and of performing the operation as soon as it can be clearly perceived that these are unsuccessful.* There is no reason to expect that a less active remedy will succeed, when a more potent one has failed. The chance of reducing a

* “ In univcrsum notandum, remedia incarcerationi opitulantia, citò et strenuè adhibenda esse, cum natura hic parum aut nihil faciat, et omnis ægroti salus ab artis auxiliis petenda sit: omnis mora, omnisque tardior aut negligentior remediorum usus, semper damnosus, sæpissime exitialis erit.”—CALLISEN, *pars poster.* p. 464.

rupture is lessened in proportion to the duration of the complaint: the prolapsed parts becoming more inflamed, are more closely pressed by the stricture, and soon fall into a state, where attempts at reduction by the hand are inadmissible. The danger, to which the patient is exposed by the operation, is less than that which he undergoes by delay. In the latter case, inflammation and gangrene of the part, with similar affections of the other viscera, and the highest degree of sympathetic constitutional irritation, are surely produced by a continuance of the incarceration. In this state the operation is performed under the greatest disadvantage, as the local and the general disorder both threaten a fatal termination. If we operate while the parts are uninflamed, the risk of the operation only is endured.*

* “ Quæ operatio per se minime periculosa est, cum nec
 “ integumentorum, nec sacci herniosi, nec anuli incisio
 “ ullum adferat periculum. Certum verò hujus operationis
 “ periculum de nimia operationis dilatione pendet, si ægròti
 “ jam viribus exhausti, partes elapsæ gravissimâ phlogosi, in
 “ gangrænam pronâ correptæ, et morbus ad reliqua contenta
 “ abdominis propagatus fuerit.”—CALLISEN, *pars poster.*
 p. 478.

Our conduct must not be guided merely by the duration of the case; the kind of strangulation, the nature of the symptoms, the effect of the means employed, and the state of the parts, must influence our determination. Small and recent herniæ, or such as, having been kept up for a long time by means of a truss, are suddenly re-produced, admit of very little delay. The strangulation is violent in such instances; and inflammation and gangrene soon come on. In old and large ruptures, which have been often down, and often replaced, the symptoms are not so urgent, nor the necessity of operating so pressing.*

It must be allowed, that the event of the operation under any circumstances, is uncertain: but the unfortunate termination, which so frequently attends it, must be ascribed, in the majority of cases, to its being delayed, until the state of the protruded

* I have mentioned some instances already (note in Chap. I. Sect. V.) where strangulated hernia proved fatal within one day. LE DRAN has related a case in which the operation was performed on the seventeenth day, and the parts were not much affected.—Obs. 57.

parts, or of the patient's general system, is such, as to leave little chance of success. This truth has appeared so clearly to the best writers on the subject, that they have taken great pains in inculcating the necessity of an early recourse to the operation. The most celebrated practitioners on the Continent agree on this point with the great surgeons of our own country; and the dangerous and fatal effects of delay are strongly represented in many parts of their writings.* Several extracts from works of the highest authority might be adduced in support of this assertion; but I shall content myself with a quotation from the *Practical Observations*† of Mr. HEY: this is particularly valuable, as it exhibits a comparative view of the event of the operation, when performed at a proper time, and when improperly delayed. When this gentleman first began practice, he considered the ope-

* See POTT's *Works*, vol. III. p. 286. BERTRANDI, *Traité des Operations*, p. 21. WILMER, *Pract. Obs. on Hernia*, p. 75. RICHTER, *Tr. des Hernies*, p. 105 and 106. CALLISEN, *Syst. Chir. Hod. pars poster.* p. 473. COOPER, *Anat. &c. of Inguinal Hernia*, p. 26.

† Page 143.

ration as the last resource, and only to be employed when the danger appeared imminent. “ By this dilatory mode of practice,” says he, “ I lost three patients in five, upon whom the operation was performed. Having more experience of the urgency of the disease, I made it my custom, when called to a patient, who had laboured two or three days under the disease, to wait only about two hours, that I might try the effect of bleeding, (if that evacuation was not forbidden by some peculiar circumstances of the case) and the tobacco glyster. In this mode of practice I lost about two patients in nine, upon whom I operated. This comparison is drawn from cases nearly similar, leaving out of the account those cases, in which a gangrene of the intestine had taken place. I have now, at the time of writing this, performed the operation thirty-five times; and have often had occasion to lament that I performed it too late, but never that I had performed it too soon.”

We may state therefore, as the general

inference from what has been now advanced, that a person can only be rescued from that danger, to which he is exposed by a strangulated rupture, by the efforts of art:—that the constant, and generally rapid progression of such cases from bad to worse, renders it necessary that the surgeon lose no time in giving a fair trial to the most powerful means, in order that, if these are inefficacious, the operation may be performed before the prolapsed parts have become inflamed and painful:—that an operation, done under such circumstances, has every chance of success:—but that if symptoms denote inflammation or gangrene of the part, the chances of a favourable event are much lessened, although the indication is still more urgent.

I shall describe the operation, when speaking of the inguinal hernia; and the account then given will apply also to the other species, except in particular points which will be noticed afterwards.

CHAP. V.

ANATOMY AND SYMPTOMS OF INGUINAL
HERNIA.

SECT. I.

*Anatomical Description of the Inguinal
Hernia.*

IT is right to preface the account of inguinal hernia with a description of the parts concerned, since an exact knowledge of these will throw much light on the subject; and will be particularly useful in performing the surgical operation which is required for its cure. Here, indeed, as in many other instances, a surgeon may get through his business without anatomical knowledge; but he cannot operate with satisfaction to himself, nor without danger to the patient;

as he must be immediately perplexed by the occurrence of any circumstance out of the usual course. Hence we cannot be surprised to find that he puts off the operation to the last moment, and, with the hopes of escaping from the performance of what he dreads, wastes that time which ought to be occupied in the operation, in the repetition of trials already found unavailing. The kind of knowledge, which I allude to, would be sought in vain in the most approved writers on hernia: for anatomy has hitherto been very little studied in reference to its connexion with surgery. I cannot therefore mean to cast any reflection on those men, whose writings have extended and improved the science of surgery, when I state, that their works shew an ignorance of this subject: the fault does not rest with them individually, but belongs to the time in which they lived. A few observations on particular points lie scattered in the works of different writers; but no complete description, and accurate delineation of the anatomy of inguinal hernia existed previ-

ously to the late splendid works of CAMPER* and Mr. COOPER.

The aponeurotic expansion, which constitutes the tendon of the external oblique muscle of the abdomen, besides its connexion to the whole length of the linea alba, is attached to the anterior superior spinous process of the ilium, and to the upper part of the pubis. Its lower margin, which is stretched between these two points, is best known by the name of Paupart's or Fallopius's ligament. As the fibres of the aponeurosis pass obliquely downwards and forwards, they separate into two distinct portions, which constitute the pillars or columns of the abdominal ring. The upper and inner of these is fixed to the symphysis pubis: the lower and outer (which is indeed the above-named ligament of Paupart) is attached to the angle and crista of the

* *Icones Herniarum Editæ a S. T. SOEEMMERRING, 1801.* These plates represent several important points in the anatomy of inguinal hernia, in that accurate and expressive style of delineation, which was peculiar to CAMPER. It must be observed, that, although they were not published till after the author's death, they had been engraved as early as the year 1757.

bone. The separation of these tendinous columns leaves a triangular space, called the abdominal ring, or ring of the external oblique muscle. The os pubis constitutes the base of the triangle; the two pillars form its sides; and the apex is the part at which these separate from each other. It is not, however, pointed; since some transverse fibres, which connect the two columns together, round off this upper part of the opening: these are found particularly strong in an old hernia. The abdominal ring is directed obliquely upwards and outwards; the upper part of it pointing towards the spine of the ilium: it is this part that is often mentioned by the name of the *external angle* of the ring.

The aponeurosis of the internal oblique muscle is separated through its greater part into two layers, of which, the anterior and thicker joins the tendon of the external oblique, the posterior and thinner is attached to that of the transversalis; but the lower portion of this tendon, together with the corresponding part of the transversalis, goes wholly in front of the rectus muscle.

The lower margin of these two muscles, (the obliquus internus and transversalis) which arises from the upper portion of Paupart's ligament, is found behind or within the outer column of the abdominal ring, and is fixed in the pubis behind the ring.

A thin fascia is extended from the inner or posterior margin of Paupart's ligament behind the transversalis, on the surface of which it is gradually lost. By this, the ring of the external oblique is closed towards the abdomen; and but for this there would be a direct opening into the cavity of the belly behind that ring.* The fascia, which we are now describing, consists of a very thin and delicate expansion. Mr. COOPER, who first noticed it, has rightly observed, that in some subjects it appears only as condensed cellular membrane.† If, after carefully removing the transversalis, we press with

* It has been hitherto an almost universally received opinion, that the abdominal ring is covered by peritoneum only at its posterior surface; and consequently that the contents of a rupture are protruded directly from the abdominal cavity. Were this a correct representation, inguinal hernia would be much more frequent than it actually is.

† P. 6.

the finger above Paupart's ligament, we shall experience a greater resistance than the unsupported peritoneum could offer; and this arises from the fascia in question.

The spermatic vessels, being previously joined by the vas deferens, run in front of the epigastric artery, near its origin, penetrate the fascia above described,* pass under the margin of the obliquus internus and transversalis, and then go obliquely downwards and forwards between this expansion, and the aponeurosis of the external oblique, until they reach the *abdominal ring*, at which they finally emerge.†

If, under the name of *abdominal ring*, we include the whole passage of the spermatic chord through the abdominal parietes, we must describe it as a canal, and not as a

* The part, at which the spermatic vessels leave the abdomen was first represented by CAMPER in his *Demonstrationes Anatomico-Pathologicæ*, published in 1760. The *Icones Herniarum* of the same author, which were engraved still earlier than this, also represent the same circumstance.

† The passage of the spermatic chord through a canal, previous to its penetrating the ring of the external oblique, is expressly stated by GIMBERNAT in his *Account of a New Method of operating for Femoral Hernia*.—p. 19 and 32.

simple opening. The upper or inner aperture is rather nearer to the pubis than to the ilium;* the lower, or outer opening, is the abdominal ring; and the canal itself extends obliquely between these points. The upper margin of the superior opening is formed by the lower edge of the obliquus internus and transversalis; which part can be felt very distinctly by passing the finger obliquely upwards and outwards through

* It is not perhaps necessary that the practical surgeon should be minutely acquainted with the exact measurement of the distances of these parts: yet I think it right to make one or two remarks on the subject, as some incorrect representations have been given to the public. In "*The Anatomy and Surgical Treatment of Inguinal and Congenital Hernia*," it is stated, that the distance from the anterior superior spine of the ilium to the symphysis pubis is six inches, and that the inner margin of the upper opening of the abdominal ring is exactly in the mid space between these. The average measurement between these two points is about five inches and a half, and six inches is the greatest distance that we ever meet with; yet, in the first plate of this book, the space between the letters *a* and *b*, which denote the two above-named points, is no less than six inches and a half, and in the second plate, it is actually seven inches and a half; both of which dimensions far exceed those of any human subject: these of course are the errors of the draftsman. The inner opening of the ring has appeared to me to be nearer to the pubis than Mr. COOPER represents it.

the ring of the obliquus externus. The other sides of the aperture, which in truth are not very clearly defined, are formed by the fascia that lines the transversalis: when we observe this part from within, the peritoneum appears slightly depressed, and it is to this that Mr. POTT alludes, under the name of *Cicatricula*, when he is mentioning the part, at which the testis leaves the abdomen.*

I subjoin the statement of the exact measures of these parts as given by Mr. COOPER in the second part of his work on hernia, lately published.

In the	MALE SUBJECT.	FEMALE.
	Inches.	Inches.
From the symphysis pubis to the ilium.....	5 $\frac{3}{4}$	6
..... to the inner edge		
..... of the inner ring...3		3 $\frac{1}{4}$
..... middle of the		
..... iliac artery.....	3 $\frac{1}{8}$	3 $\frac{3}{8}$
..... course of the		
..... epigastric artery		
..... on the inner side		
..... of the inner ring...2 $\frac{3}{4}$		2 $\frac{7}{8}$
..... middle of the		
..... crural ring.....	2 $\frac{1}{4}$	2 $\frac{3}{8}$

* *Treatise on Ruptures*, in his works, vol. II. p 21. He makes however a very gross blunder, in stating, that this cicatricula is exactly opposite to the ring of the external oblique.

The epigastric artery, springing from the external iliac trunk, close to Paupart's ligament, goes behind the spermatic chord; it runs precisely along the inner margin of the superior aperture of the ring, and then bends obliquely upwards and inwards, so as to pass at the distance of half an inch, or an inch, from the upper extremity of the ring of the external oblique, in its course to the posterior surface of the rectus muscle.

In inguinal hernia, the parts are generally protruded directly over the spermatic chord: at first, therefore, they penetrate the upper opening; and afterwards, having traversed the canal, make their appearance through the ring of the external oblique. They may pass the upper opening, without continuing their course through the lower one.* The

* This circumstance was well known to PETIT, who seems to have understood the anatomy of this kind of rupture, as the following quotation will fully prove. “ J’ai vu
 “ plusieurs hernies situées sous l’aponévrose du grand ob-
 “ lique; de sorte que les parties, après avoir poussé le péri-
 “ toine au-delà du muscle transverse et de l’oblique interne,
 “ n’ayant pu forcer l’anneau de l’oblique externe, s’étoient
 “ réfléchies entre cette aponévrose et l’oblique externe.”—
Traité des Mal. Chirur. Œuvr. Posthume de I. L. PETIT,

cause of strangulation may be either in the upper or lower aperture of the ring. According to Mr. COOPER,* the former is most frequent in recent and small herniæ, the latter in old and large ruptures. The stricture may occur in the upper orifice, where the parts have passed the ring completely, the tendon of the obliquus externus remaining loose and free: a rupture may also be strangulated by both openings at once.

The strangulation in the upper opening probably constitutes the case, which surgeons have generally described as arising from a stricture in the neck of the sac. We can readily conceive, that the parts, which form this opening, may produce a state of incarceration, while it is very difficult to imagine that a soft and extensile membrane, like the peritoneum, which yields to any impelling or distending force, should ac-

tom. II. p. 247. CALLISEN has mentioned an instance, in which the rupture was of this kind; although ROUGÉMONT, who notices it in the additions to his translation of RICHTER, has so totally mistaken the nature of the case, as to call it a crural hernia; and Dr. MONRO has copied this mistake, *Traité des Hernies*, p. 304. MONRO on *Crural Hernia*, p. 70.

* page 21.

quire such a power of contraction, as to form a stricture on the prolapsed viscera. BERTRANDI* directly asserts, that the transversalis and internal oblique sometimes cause strangulation. That the instances related by others are of the same nature, is rendered very probable by this circumstance; that the stricture is generally said to have been at some distance within the ring of the internal oblique; whereas if it were formed by the peritoneum, there seems to be no reason why it should happen in that particular situation. In three cases, which occurred to Mr. WILMER,† the stricture was

* *Traité des Operations*, p. 30.

† *Practical Observations on Hernia*, p. 3 and 15. In the advertisement to the second edition Mr. WILMER expresses himself very strongly as to the frequent occurrence of stricture in the situation we are now considering. “ In one-third of
“ the cases in which the author has been obliged to have re-
“ course to the knife, the cause of the strangulation was in
“ the neck of the hernial sac; and he is convinced that if
“ the inexperienced operator considers the stricture to be
“ found only in the tendinous openings of the abdominal
“ muscles, many lives must be unavoidably lost. He was
“ early led to the consideration of this subject, having seen
“ the intestine burst by the rude efforts made to return it
“ after the opening of the external oblique muscle had been

more than an inch higher than the external opening of the tendon. ARNAUD* found a stricture two inches behind the ring, and LE DRAN has a similar observation.† Mr. HEY‡ was obliged to divide the ring pretty freely in order to get at the internal stricture.§

The spermatic chord runs along the back of the hernial sac throughout its whole course.

When we consider, that the epigastric artery in the natural state, goes first behind the spermatic chord, and then along the inner margin of the upper opening, and that

“ dilated, in two cases where the operation for strangulated
“ herniæ was performed during his attendance at the Lon-
“ don hospitals.”

* See his remarks “ *Of the Strangulation of the Intestine by the Peritoneum*, p. 353 et seq.

† *Observations*, p. 60.

‡ *Practical Observations*, p. 174.

§ However we may decide the question concerning the part which forms the stricture in these cases, the practical observation is the same; viz. that we may very often expect to find the tendon of the external oblique quite free, while the obstacle, which prevents the return of the parts, is situated further in towards the abdomen; and that there may be a stricture in the latter situation combined with one of the former kind.

the viscera are protruded over the chord, it will immediately appear, that, in a case of bubonocoele, the parts are protruded on the outer side of the artery, and that this vessel must be situated first behind the neck of the sac, and then on its inner side. This is so precisely the case, that, if we examine the mouth of the sac towards the abdomen, its inner margin (that which is situated towards the pubis) seems to be actually formed by the course of the artery.

The situation of this vessel, in relation to the neck of the hernial sac, is a point on which great variety of opinion has subsisted among surgical writers: this may have arisen in some degree from the actual variation in the position of the artery; but there can be no doubt that the chief cause has consisted in the want of a sufficient number of investigations, and particularly of the parts in their altered state. Thus, RICHTER* supposes that the artery is found near the external angle of the ring, in the diseased, as well as the healthy state of parts; and he supports his opinion by stating, that

* *Traité des Hernies*, p. 123.

the vessel was divided in the dead subject by cutting upwards and outwards, and never, by directing the incision towards the linea alba. It is very clear, that these observations can only apply to the healthy state of parts. CAMPER* has noticed the change of situation, which this vessel undergoes in inguinal hernia:—"In herniis igitur inguinalibus, arteria et vena epigastrica versus pubem a prolapsis intestinis compelluntur." CHOPART and DESAULT not only knew the ordinary situation of the artery in bubonocoele, but were acquainted with the more uncommon case, in which it is found near the external angle of the ring. "Mess. CHOPART et DESAULT admettent l'artere epigastrique au coté interne de l'anneau, et rarement au coté externe dans le cas de hernie."† This statement is confirmed by the testimony of ROUGEMONT,‡ who adduces his own experience on the subject, and rightly adds, that when the artery is on the outside of the ring, the spermatic chord

* *Demonst. Anat. Pathol*, lib. II. p. 5.

† ROUGEMONT in a note to his translation of RICHTER, p. 124.

‡ *Ibid*, p. 124.

is situated on the outside of the hernial sac. The variation in the course of the vessel is also rightly stated by SABATIER.* The truth of the opinions entertained by CAMPER, DESAULT, ROUGEMONT, and SABATIER is fully confirmed by the more ample experience and extensive researches of Mr. COOPER, whose excellent work on the anatomy and surgical treatment of inguinal hernia I have had such frequent occasion to refer to.

When a hernia is first formed there is some distance between the upper and lower openings of the ring; the latter is placed obliquely upwards and outwards with respect to the former; but the pressure of the protruded viscera gradually brings these nearer and nearer together, so that in an old and large rupture, the opening into the abdomen is almost direct. The effect of this process is such in all cases, that we seldom meet with an instance, in which the rupture has passed the external oblique, where the natural distance between the two openings is preserved. The epigastric artery still retains the same position in respect to the

* *Médecine Opératoire*, tom. I. p. 92.

neck of the sac : but the approximation of the upper to the lower opening, brings this vessel nearer to the pubis.* In the natural state it is about two inches from the angle of that bone, at the part where it bends along the inner margin of the opening ; its distance at the corresponding part in a bubonocoele now before me is only three quarters of an inch.

The direction, which I have now described, is that which the inguinal hernia commonly takes ; but on rare occasions it deviates from this course. Instead of passing along the canal of the ring, it penetrates at once the opening of the external oblique, here the communication with the abdomen is immediate and direct. The spermatic chord lies on the outer side of the swelling ; and the epigastric artery, which is commonly found behind, runs now in front of the sac, at its usual distance from the upper end of the ring of

* This circumstance is noticed by CAMPER in his *Demonstrationes Anatomico-Pathologicae*. “ In herniis igitur inguinalibus, arteria et vena epigastrica versus pubem a prolapsis intestinis compelluntur,” lib. II, p. 5.

the external oblique. The exact proportion in point of number, between the cases of the latter and former descriptions has not been hitherto ascertained: it only appears that the first described course is by far the most frequent.*

The protruded viscera, which constitute a hernia, are immediately surrounded by a bag formed of the peritoneum, and retaining generally the same thin and delicate structure, which this part possesses in its natural state.† The peritoneal sac is covered by

* It should appear that CAMPER had only seen one instance of the rarer kind, which occurred to him in the year 1759, *Edinburgh Review*, vol. I. p. 465. CHOPART and DESAULT had probably met with more frequent opportunities of observing this species of rupture; as they direct the incision of the ring to be varied according to the course of the vessel, *Traité des Maladies Chirurgicales*, tom. II. p. 263. One instance occurred to ROUGEMONT (note in his translation of RICHTER's Treatise on Ruptures, p. 125); and Mr. COOPER's practice has furnished him with seven examples of the same kind, chap. XV. I have met with three cases of this description.

† Although surgeons in general have supposed that the hernial sac consists merely of peritoneum in various states of density; and have considered the thickened state, in which it is generally found, to arise from distention, yet some writers have understood the real nature of the case. Thus

another investment of various degrees of thickness, consisting probably, in great part, of the surrounding cellular substance, condensed into a membrane-like appearance, by the pressure of the hernia; in the same way as tumours acquire their investing cyst. This external coat of the sac possesses some tendinous fibres in its structure, derived from the aponeurosis of the external oblique, where it forms the ring. The cremaster muscle is also expanded on its surface: it consists usually of several layers, the divi-

SHARP very correctly observes, that, “when the herniary sac falls into the groin or scrotum, the investing membrane (of the spermatic chord,) together with the cremaster muscle, which covers it, become distended, and form, in consequence of that violence, an absolute vagina.” *Critical Enquiry*, edition III. p. 5.

MAUCHART speaks of the peritoneal sac being surrounded by a thicker external coat, separable into many layers; and having tendinous fibres derived from the aponeurosis of the external oblique: for which reason he calls it *tunica aponeurotica*.—HALLER's *Disputat. Chirurg.* tom. III. p. 85.

The latter fact is also noticed by GUNZ, *ibid* p. 110. WRISBERG describes the exterior covering of the hernia, and mentions that it is formed of the cremaster, and tendinous fibres derived from the oblique muscle: he calls it *velamen accessorium*, and represents it in a dissected view of a scrotal hernia.—*Comment. Reg. Societ. Scient. Gotting.* 1778, p. 69.

sion of which in the operation often leads the surgeon to suppose that he has opened the hernial sac.

We should hardly have supposed a priori that the peritoneum is susceptible of such considerable extension as it frequently suffers in cases of hernia. Scrotal ruptures often descend to various distances on the thigh, sometimes indeed even to the knee; yet the whole inner surface of the bag, in which all the loose viscera of the abdomen may be contained, is lined by a continuation of peritoneum; indeed the hernial sac taken altogether is generally thicker and stronger in proportion to the size of the tumour, and to the duration of the complaint. Yet, occasionally, instead of an increased thickness, we observe the opposite process of absorption or thinning, in large ruptures: in some cases the coverings are so reduced, that the convolutions and vermicular motions of the intestines may be distinguished through the skin; hence, it may appear that the sac is entirely wanting; but it will be possible to trace it in the neighbourhood of the opening. The contents of a rupture

may be found immediately under the skin, when the hernial sac has been burst by a blow;* but this is an unfrequent occurrence.

The exterior covering is every where closely connected by cellular substance to the proper peritoneal sac. Hence the latter part is not returned into the abdomen, when the contents of the swelling are replaced, but remains behind ready to receive any future protrusion. At the first moment of the occurrence of a hernia, the protruded peritoneum must, of course be unconnected to the parts among which it lies. But adhesions take place so quickly, that we find the sac universally connected to the contiguous parts, even in a rupture of a few days standing: and these connexions become afterwards so strong and general, that we might suppose the hernial sac to have been originally formed in its unnatural situation. The difficulty which this structure would occasion in separating the hernial sac from the surrounding parts, and particularly from the spermatic chord, constitutes an insupe-

* COOPER, pt. I. p. 3.—*Supplement au Traité de I. L. PETIT sur les Mal. Chir.* p. 113.

rable objection to any proposal for returning the sac into the abdomen, and must have been a source of great danger in some of the old methods of attempting the radical cure of ruptures.

I have already stated that the spermatic chord goes usually behind the hernial sac, and that in rarer instances it passes on the outer side of that part. Sometimes it deviates from both these courses. LE DRAN,* SCHMUCKER,† and Mr. BLIZARD‡ have seen the whole chord lying in front of the sac. The vas deferens has passed on one side of the sac, while the spermatic vessels ran on the other.§ In some cases the protrusion of the hernia has so separated these parts, that the vas deferens ran on the anterior and inner, and the vessels on the posterior and outer part of the swelling;|| in other

* *Traité des Operations*, p. 127.

† *Vermischte Chirurgische Schriften*, vol. II. p. 55—He mentions two instances.

‡ COOPER, pt. 1, p. 49.

§ COOPER, pt. 1, pl. V, fig. 5. POTT's *Works*, vol. II, p. 68. CAMPERI, *Icones Herniarum*, tab. XIII, fig. 1.

|| CAMPER, pl. VIII, fig. 2. HEX's *Practical Obs.* p. 146.

instances the vessels have been before, and the vas deferens behind the sac.*

I am aware that a person, who is not well acquainted with the anatomy of the abdominal muscles, will find a difficulty in understanding the account which I have given of the parts concerned in inguinal hernia. A clear notion of the subject cannot be conveyed, by any merely verbal description, to a person previously unacquainted with it. In order to acquire a satisfactory knowledge of the parts, a careful investigation of them, both in their healthy and diseased state, must be combined with a reference to the best plates and descriptions. It may however facilitate the progress of a beginner, to enumerate the parts as they are met with successively, in dissecting a hernia from the surface downwards. The removal of the integuments exposes the exterior investment of the hernial tumour continuous with the margins of the ring, and formed of tendinous fibres from the aponeurosis, the cremaster muscle, &c. This is con-

* CAMPER, pl. VIII, fig. 1. COOPER, pt. 1, p. 9 and 10.

nected by cellular substance to the proper hernial sac formed of the peritoneum. This production of peritoneum passes through the ring of the external oblique, and then goes upwards and outwards. Behind and above the ring, the inferior margin of the obliquus internus and transversalis crosses the neck of the sac. When these muscles are reflected towards the linea alba, the fascia ascending from Paupart's ligament, and forming the upper opening of the ring, is exposed, and the epigastric artery is discovered emerging from the inner side of the neck of the hernial sac,* which, at this precise point, becomes continuous with the peritoneum lining the abdomen. The removal of the hernial sac will disclose the course of the spermatic chord in its descent towards the testicle; and when this is also elevated, the first part of the course of the epigastric artery, and its origin from the iliac trunk, are laid open.

The dissection of the second species of inguinal hernia differs from this in some points. The hernial sac goes directly up-

* CAMPERI *Icones*, tab. X. F. M.

wards through the ring of the external oblique, behind which it is crossed by the lower margin of the internal oblique and transversalis; the epigastric artery runs at a little distance from the upper and outer edge of the sac; and the spermatic chord is situated rather towards the outside of the swelling.

The inguinal hernia of females does not require a particular description, as its anatomy resembles that of the same rupture in the male subject. The round ligament of the uterus has the same relation to the swelling as the spermatic chord in the male. It has never yet been observed in the female on the inner side of the epigastric artery.*

* Since I sent this Essay to the college, I have met with an example of inguinal hernia on the inside of the epigastric artery in the female: it occurred in a subject, which was brought to the anatomical theatre, at St. Bartholomew's hospital, for dissection, and was discovered by Mr. HAFFENDEN, a very intelligent and industrious student, who pointed it out to me.

SECT. II.

Symptoms of Inguinal Hernia.

THE inguinal hernia possesses the common symptoms which have been mentioned in the general description of the complaint. The additional circumstances, which bestow a distinctive character on this particular species, are derived from the situation of the swelling. The tumour extends from the abdominal ring to various distances in the scrotum. It is first perceived in the groin, and descends gradually in front of the spermatic chord. The testicle may be felt below or behind the swelling, and the spermatic chord can sometimes be traced at the back of the tumour. It always appears to extend into the ring, and is hence distinguished from most other affections of these parts.

This rupture sometimes assumes a different appearance; it does not pass the ring

of the external oblique muscle, but is covered by the aponeurosis just behind that aperture, being protruded through the upper opening only. The swelling in this case is always a small one, and its extent by no means clearly defined.

The inguinal hernia is occasionally, but rarely, found in females; while its occurrence in the other sex is so frequent, that it has been calculated that forty-nine out of fifty ruptured males have this kind of descent. The greater dimensions of the ring in the male subject account satisfactorily for this difference. The swelling is formed in the labium of the female, where there can be no risk of confounding it with other complaints.

An attentive examination of the origin, progress, and symptoms of the complaint will enable us to distinguish a rupture from a hydrocele or varicocele.

If we see a swelling of the scrotum uniform on its surface, which commenced below, and gradually ascended; if we cannot feel the testicle, but are able to discern the spermatic chord of its natural size above

the tumour; and particularly if we can distinguish a fluctuation, or discover a degree of transparency in it; we are confident that such swelling is caused by an effusion of fluid into the cavity of the tunica vaginalis testis. We conclude that the complaint is a rupture, when the swelling began at the ring, and gradually descended; when the spermatic chord cannot be felt, but the testicle may be distinguished; and when the symptoms described above, as belonging to a rupture, exist at the same time.

A hydrocele sometimes extends along the chord as high as the ring, the swelling at the same time being so tense that no fluctuation can be perceived.

In the case of congenital hernia the testis cannot be distinguished.

The sensation, which the convoluted and distended veins of a varicous spermatic chord impart to the fingers of the examiner, is so characteristic, that a person, who has once felt it, can never mistake varicocele for hernia. As the swelling admits in this case of being diminished or destroyed by pressure, Mr. COOPER recommends the following

mode of distinguishing the two complaints, in case of doubt:—Let the patient be placed in a recumbent position, and have the swelling reduced. The surgeon presses on the ring with his finger, and allows him to rise. The pressure is sufficiently forcible to prevent any of the viscera from falling down, but not to stop the passage of blood through the spermatic artery. If the tumour should re-appear, while this pressure is kept up, the case is a varicocele.

The absence of the testis from the scrotum, together with the peculiar sensation excited by pressing the tumour, sufficiently discriminate the case of a testicle on its descent.

CHAP. VI.

OPERATION FOR STRANGULATED INGUINAL HERNIA.

THE operation for bubonocoele, as indeed for any other species of rupture, consists of the following parts: incision of the integuments; dissecting down to the sac, and opening it; removing the stricture; and replacing the protruded viscera.

SECT. I.

Exposing and opening the Hernial Sac.

THE patient should be placed in the horizontal position, with his pelvis at least as high as the rest of the trunk. It will there-

fore be convenient for him to lie on a bed, with his lower extremities hanging over the side. The thigh should be maintained in the bent position, by placing the foot of the affected side on a chair. The hair must be completely removed from the tumour and surrounding parts. The operator, being seated between the lower extremities of the patient, makes his external incision, which should begin an inch above the external angle of the ring, and extend over the middle of the tumour, to its lower part. By beginning the incision above the ring we gain room where it is much needed in a subsequent part of the operation; viz. the incision of the stricture. This cut may be either performed by a single stroke of the knife, or, as some prefer, by pinching up the integuments, and dividing the fold with a double edged scalpel. In the latter case the incision generally requires to be enlarged in both directions. The single cut is accomplished with less pain to the patient, and has the appearance of greater adroitness. In executing this incision, or in the subsequent dissection down to the sac, the ex-

ternal pudic* branch of the femoral artery may be divided, and afford a sufficient hemorrhage to induce us to secure it before we proceed,

The cellular substance intervening between the skin and hernial sac should be carefully divided, layer by layer, with the knife and dissecting forceps. To avoid all risk of cutting through the sac, and wounding the prolapsed parts, each successive layer may be elevated with the forceps, and divided with the knife inclined somewhat towards the horizontal direction: this precaution should be more particularly observed as we approach the sac. It is sufficient to dissect down in this way at one part: the opening in the sac may be made by elevating it with the forceps, and dividing the apex of the elevated portion with the knife held horizontally; or we may use the finger and thumb, pinching up the membrane between them, and rubbing them together in order to ascertain that none of the protruded parts are included. The aper-

* The origin and course of the vessel may be seen in CAMPER'S XIII. plate.

ture should be enlarged in both directions with the probe-pointed bistoury, guided by the finger or director, until the whole cavity is laid open. The sac generally contains a small quantity of fluid,* the discharge of which shews that the cavity is penetrated; and as this fluid gravitates towards the lower part of the tumour, that should be selected for dissecting down to the sac.

As this fluid is not always present, the surgeon cannot depend entirely on its appearance as indicating that the cavity is opened. The blood vessels of the intestine, and its smooth polished surface distinguish it from the hernial sac, which has not those vessels, which is rather rough and cellular on its surface, and which is always connected to the surrounding parts, although

* The fluid of the hernial sac is sometimes accumulated in very large quantity. SCHMUCKER has seen a quart of water in a rupture—(*Vermischte Chirurg. Schriften*, vol. II, p. 55) Mr. POTT has often found so large a collection in old omental herniæ, that it was necessary to puncture them for its discharge—(*Works*, vol. II, p. 39,) MONRO removed six pints from an old scrotal rupture, to the great relief of his patient, (*Edinburgh Essays*, vol. V, p. 259.)

these adhesions in a very recent case may be but slight.

The operator must remember, that, when the sac is opened, a probe or the finger will pass freely in any direction within its cavity:* the division of the exterior investment often leads him to suppose that he has cut into the true hernial sac. Many surgeons are accustomed to make great use of the probe in this part of the operation: they thrust the blunt end of the instrument into the cellular substance, and divide with the knife what they have thus raised. This practice carries with it a great appearance of roughness and awkwardness, and is a much less convenient and speedy way of accomplishing the intended object, than the method which I have described.

The variations, which I have mentioned in the course of the spermatic vessels and vas deferens, should lead us to ascertain, if possible, the situation of these parts before

* The accidental circumstance of adhesions between the investing membrane and the contained parts hardly deserves to be mentioned as an exception to this observation.

we operate, that we may avoid all risk of wounding them. The practice of dividing the integuments and hernial sac separately, and of dissecting the intervening substance cautiously, will protect these vessels from danger where their course cannot be made out. The plan, which has been recommended, of making a small cut in the skin, of opening the cavity of the tumour, and then carrying the incision through the rest of the skin and hernial sac at once, would certainly expose them to considerable danger. Mr. HEY* divided the vas deferens in this manner.

SECT. II.

Incision of the Stricture.

THE contents of the hernia, being thus exposed, may sometimes be returned into the abdomen, without dividing the ring; and they should be so replaced, if it can be done without force. The incision of the

* *Practical Obs.* p. 146.

tendon should be accomplished by a curved probe-pointed bistoury* guided by the finger of the operator, which will guard the protruded parts: should the tightness of the stricture exclude the employment of the finger, its place may be supplied by a grooved director, the protruded parts being at the same time carefully drawn aside to avoid all risk of wounding them. The incision should be just of a sufficient length to allow the viscera to be replaced with ease.

The proximity of the epigastric artery to the mouth of the sac renders the direction of the incision a matter of considerable importance. The practitioners of this country have generally followed the advice of SHARP† and PORT,‡ who direct it to be carried upwards and outwards, *i. e.* towards the spine of the ilium; and there is no danger of injuring

* The operator generally employs the crooked knife, which is contained in his pocket case of instruments; the blade of which is moveable on the handle. It would be much more convenient for operating on herniæ, to have one with a fixed blade, or, at all events, one of that construction in which the blade becomes fixed when the knife is opened.

† *Critical Inquiry*, p. 29.

‡ *Works*, vol. II. p. 106.

the vessel by cutting in this direction, in the generality of inguinal ruptures. But it would be endangered in the more rare case, where the hernia descends on the inner side of the artery; although, even here the vessel is situated at such a distance from the external angle of the ring, that the return of the parts can seldom require so large an incision as to expose it to danger.*

Those surgeons, who have supposed that the artery has the same relation to the abdominal ring in the diseased, as in the natural state of parts, direct the incision to be made in a course precisely opposite

* That, the direction of the incision towards the spine of the ilium does not necessarily endanger the epigastric artery, when this vessel takes its course along the outer side of the hernial sac, is satisfactorily proved by a case, which I have related in a subsequent part of this chapter. We are indeed justified in concluding, that the artery has often escaped under these circumstances, when we consider, that it has been, and still is the general practice, to cut the tendon upwards and outwards, and yet that a wound of the vessel seems to be a most rare occurrence. Mr. POTT must have performed the operation for the strangulated bubonocoele a vast number of times: yet no instance of a division of the artery is recorded in any part of his works; nor did he mention any such case in his surgical lectures.

to that abovementioned. RICHTER* and BERTRANDI† carry the knife upwards and inwards, or towards the umbilicus: their advice might be followed in the more rare instances where the artery is on the outside of the rupture; but would be highly dangerous in the common case, where it runs along the inner margin of the mouth of the sac. The danger increases in proportion as the incision approaches to a course directly inwards; and the vessel must inevitably be cut if the knife were guided horizontally towards the linea alba. CHOPART and DESAULT‡ vary the direction of their incision according to the actual variation in the position of the artery: thus, they divide the tendon upwards and outwards, when the spermatic chord is behind, or on the inside of the sac; upwards and inwards, when it is before, or on the outside of the hernia.§

* *Traité des Hernies*, p. 123.

† *Traité des Operations*, p. 29.

‡ *Traité des Maladies Chirurgicales*, tom. II. p. 263.

§ Although it will hold good, as a general observation, that the spermatic chord passes behind the hernial sac in the common species of inguinal rupture, and on the outer side of

The view, which I have given of the anatomy of the parts, will shew that the artery can never be exposed to the slightest risk, if this direction be followed. It happens, however, unfortunately, that we cannot always ascertain sufficiently the nature of the case; that the distinguishing marks of the two kinds of rupture are not laid down with sufficient accuracy, to enable practitioners in general to decide upon the subject. Nor indeed does the case seem to me to admit of such a diagnosis. A common case of scrotal hernia, in which the upper opening, from the duration of the complaint, has been brought opposite the lower one, cannot be distinguished by external examination from that species, in which the viscera protrude directly from the abdomen. The spermatic chord cannot be felt, and if it could, its position could not be relied on as an indication of the course of the hernia.

this part in the less frequent kind; the vessel does not invariably follow these directions: I have seen it directly behind the sac in a case of the latter description; and the varieties in its course, enumerated in SECT. I. of CHAP. V, prove satisfactorily that we cannot regulate our mode of executing this part of the operation by the position of the spermatic chord.

In case of doubt, ROUGEMONT* directs us to divide the ring directly upwards, *i. e.* in a course parallel to the *linea alba*, as the artery can never be endangered by cutting in that direction. Mr. COOPER adopts this practice of ROUGEMONT, and follows it in all cases; very rightly considering that a multiplicity of directions, adapted to various circumstances, might confuse those, who are but imperfectly acquainted with the structure and relative position of the parts; and that, on this account, it is desirable to lay down a general rule, which may be followed without danger in every instance of inguinal rupture. The precise point, at which the incision of the tendon should be made, is at the middle of the superior margin of the ring; the artery can never be situated at this part, nor be exposed to danger

* “ Je crois d’après cela, qu’il est permis de croire qu’on
 “ court moins de risque de léser l’artère épigastrique en in-
 “ cisant en haut et en dehors, qu’en incisant en haut et en
 “ dedans; que pour reconnoître exactement la disposition de
 “ cette artère, il faut s’assurer de la position du cordon sper-
 “ matique relativement au sac; supposé que ce et la soit im-
 “ possible, il faut inciser au milieu du bord supérieur de
 “ l’anneau.”—Note to RICHTER, p. 125.

unless the incision be extended to a most unreasonable length.

When the stricture is in the superior orifice of the ring, the epigastric artery is invariably found on the inner margin of the aperture; and cannot therefore be injured by carrying the incision towards the spine of the ilium; nor does the practice of cutting directly upwards expose it to any risk. The instruments to be employed in dividing the stricture, and the manner of using them are nearly the same as when the tendon of the external oblique causes the incarceration. The bistoury recommended by Mr. COOPER, which has a cutting edge extending only to a certain distance from the point, should be employed for this purpose. It must be introduced with the flat side towards the finger, until the probe point has passed under the stricture, when it may be turned up so as to bring its edge in contact with the transversalis, and to divide that muscle to the required extent.

The protruded parts may be strangulated, both in the upper and lower openings, at the same time, so as to require an incision

in both these situations for their complete liberation. Hence the division of the tendon of the external oblique does not always set the parts free; and the surgeon should in every instance pass his finger in the direction of the ring, to ascertain whether any further stricture remains to be divided.

If the incarceration be caused by the upper opening only, there can be no necessity for enlarging the ring of the external oblique; unless it should so confine the finger of the operator, that he cannot reach the stricture. This circumstance can hardly happen, when the incision of the integuments has been begun sufficiently high: yet it did take place in the case which I now proceed to relate; and of which I am induced to mention the particulars, because they are interesting in several points of view.

CASE.

A MAN about fifty years of age had been subject for many years to a rupture, which

could be returned without difficulty. Constipation took place on the 24th of January, 1806, and, continuing unrelieved, he was brought to St. Bartholomew's hospital on the 30th of the same month. His belly was distended, but not painful; and a slight degree of sickness was present. About half way between the ring and scrotum he had a soft and somewhat elastic tumour of the size of a pigeon's egg, which bore pressure without causing pain. The ring of the external oblique was perfectly free from tension; there was no testicle on that side of the scrotum. Strong cathartics and tobacco glysters having failed in procuring any relief, the operation was performed on the seventh day from the strangulation. The tumour consisted of a hernial sac full of fluid; when this had been laid open up to the external oblique, the operator discovered that a piece of intestine was strangulated in the internal aperture. He could just reach this with his finger; but he was obliged to divide the lower ring extensively, before he could remove the stricture of the upper opening:

this was at last effected, and the intestine returned. No blood was shed during the operation. Mild and stronger purgatives, and glysters were all equally ineffectual in removing the constipation, and the patient died on the following evening. The tendon of the external oblique muscle had been cut upwards and outwards for two inches; it had also been divided upwards and inwards for a space of three-quarters of an inch. The latter incision, which had included the inferior margin of the obliquus internus and transversalis, had completely divided the epigastric artery at three-quarters of an inch from its origin. It did not appear that the smallest quantity of blood had escaped from the divided vessel. Within the abdomen, and just behind the ring, there was a small piece of intestine perfectly black and gangrenous, which had been strangulated by a preternatural band of adhesion, extending from the peritoneum, close to the ring, to the mesentery. The convolutions of the small intestine, exceedingly distended (to two and three inches diameter) seemed to fill the whole abdo-

men. They were slightly agglutinated to each other, and marked here and there with red streaks. The lower extremity of the testis lay just in the upper opening of the ring.*

This case shews us, that strangulation may proceed to the complete mortification of the intestine, without producing any of those symptoms, which are ordinarily de-

* The state of the testis in the present case leads to some interesting remarks. The body of the gland was not more than half its usual size: the epididymis, which was very imperfect, ran for about an inch behind the hernial sac, and did not join the body of the testis. Another case of hernia, which I had the opportunity of examining through the kindness of my friend Mr. CROWTHER, presented the same appearances, viz. an imperfect body of the testis just within the ring, and an incomplete epididymis, which ran down behind the hernial sac. Both the preparations are preserved in the museum of St. Bartholomew's hospital. These cases corroborate the opinion of Mr. HUNTER concerning the cause of the testicles not quitting the abdomen. He says upon this subject, " I am inclined to suspect that the fault originates in the " testicles themselves," and again " When both testicles " remain through life in the belly, I believe that they are " exceedingly imperfect, and incapable of performing the " natural functions of those organs; and this imperfection " prevents the disposition for their descent from taking place." —*Remarks on the Animal Economy*, p. 16 and 18.

scribed as attending such a termination; with the production indeed of very slight inconvenience to the patient. It demonstrates the danger of cutting upwards and inwards, and it proves that the epigastric artery *may* be divided without the slightest hemorrhage ensuing from the division.

SECT. III.

Wounds of the Epigastric Artery.

I CANNOT quit this part of the subject without adding some remarks on the effects of cutting the epigastric artery. Surgical writers have generally stated that a division of this vessel would be attended with a fatal hemorrhage; and the size of it's trunk, together with it's immediate origin from so large an artery as the external iliac, renders the assertion very probable. Yet I have not been able to meet with any recorded cases, in which actual examination has proved a wound of this vessel to be the

cause of death. GUNZ* ascribes the death of two patients to this circumstance; but, as I have not been able to meet with his work, I do not know whether he ascertained the fact by dissection. BERTRAND† asserts in general terms that a fatal hemorrhage has ensued several times from division of the epigastric artery. Mr. COOPER‡ gives us an instance, in which a person died from hemorrhage after the operation; and another, in which repeated bleedings brought the patient very low. In one of Mr. HEY's§ cases there was considerable bleeding, but it was stopped by the use of sponge. The case, which I have just related, presents an example of the epigastric artery being completely divided, without occasioning any hemorrhage during the operation, or previously to the patient's death. I have seen another instance, in which it seems certain

* *Obs. Anatomico-Chirurg. de Herniis.* See CREUTZENFELD *Bibliotheca Chirurgica*, p. 829.

† *Traité des Operations*, p. 29.

‡ Page 53.

§ Page 159.

that this vessel must have been cut, but the fact was not ascertained.

CASE.

In the operation for femoral hernia the stricture was divided upwards and outwards. As the first incision did not gain sufficient room for the return of the intestine, the cut was repeated in the same direction. The wound immediately filled with arterial blood, which rose again almost directly to the edges of the incision, when removed with the sponge. The mouth of the vessel could not be distinguished: while we were deliberating on the propriety of passing a needle in such a direction as would be likely to include the artery, the patient, who had lost about a pint of blood, fainted, and the bleeding ceased; nor did it come on again. This woman recovered completely.

In addition to these circumstances, I may state, that the occurrence of hemorrhage, even to a very considerable amount, after

the operation, is by no means a certain proof that the epigastric artery has been wounded; and that large bleeding may occur, where examination after death does not detect a wound of a considerable vessel. These assertions will be justified by the following case.

CASE.

THE operation for bubonocoele was performed on a man, at St. Bartholomew's Hospital, October 18, 1806, the tenth day after strangulation. The intestine was generally adherent to the neck of the sac, and its return required but a very small division of the ring, which was made upwards and outwards. No blood was shed during the operation; hemorrhage however took place on the same evening, but yielded to the application of cold cloths. Symptoms of inflammation occurred in the following evening, and were not subdued till the end of four days; in which time the patient lost ninety-six ounces of blood from the arm, and had twelve leeches ap-

plied to the abdomen. On the morning of the eighth day a profuse hemorrhage took place from the wound; it consisted of arterial blood, and did not cease till two pints at least had been lost. He survived this occurrence about a week, during part of which time well-grounded hopes of his recovery were entertained. The most violent and general inflammation was found to have taken place over all the small intestines. They were throughout of a florid red colour, and coagulable lymph had been deposited in considerable quantity on the surface. The parts forming the rupture had been protruded on the inner side of the epigastric artery, which, with it's accompanying veins, was at least three quarters of an inch from the point to which the incision of the ring had extended, and of course had not received any injury. The spermatic chord passed on the outer side of the hernial-sac, but had not been wounded. It appeared that a small artery, which the epigastric sends to the spermatic chord, had been cut; but it's size did not seem at all adequate to the supply of so profuse a bleeding.

The conduct which a surgeon should pursue, in case he had divided the epigastric artery, would probably be influenced by the circumstances of the case in which the accident happened. If the extent of the hemorrhage induced an opinion that this vessel had been cut, the operator should dilate the wound in order to gain as near a view as possible of the source of the bleeding; and should then use the needle and ligature accordingly. The chance of stopping the hemorrhage will be much increased, if his knowledge of the anatomy of the parts be accurate.

SECT. IV.

Incision of the Tendon without including the Sac.

IN all the remarks which I have made respecting the division of the stricture, I would have it understood, that the portion of peritoneum, which constitutes the neck of the sac is to be included in the incision.

A deviation from this, which is the usual mode of operation, has been proposed by Mr. COOPER.* He would have the tendon only divided, being unwilling to implicate the sac in the incision, and therefore insinuates his curved bistoury between these parts. He mentions two advantages as connected with this method. The incision in the sac, being more remote from the peritoneum, will be less likely to excite inflammation in that membrane; and if the epigastric artery should be wounded, it will not bleed into the abdomen. An accurate comparative trial of both methods would be necessary in order to determine the weight of the first reason. The second circumstance cannot be a matter of any importance, if we cut in such a direction as to avoid the risk of wounding the artery.

Many circumstances present themselves as objections to this proposal. The manœuvre itself, although perhaps easy to the experienced hand of such an able anatomist as Mr. COOPER, would, I am convinced, be found highly difficult, if not impracticable,

by the generality of surgeons. This difficulty arises from the firm manner in which the sac and surrounding parts are connected, we might almost say, consolidated to each other. The experience of RICHTER* shews that this objection is founded in reality. He once tried to divide the ring, without cutting the sac, but he found it impracticable. If the stricture is so tight, as to prevent the introduction of the finger, there must be great danger of wounding the protruded parts.

The practice would still be not advisable, even if it could be rendered as easy as the common method of operating. Mr. COOPER leaves an inch of the sac below the ring undivided; thus a bag remains ready to receive any future protrusion, and the chance of a radical cure is diminished. It would be better to follow the advice of RICHTER, and scarify the neck of the sac, in order to promote an adhesion of its sides. He has found this practice so successful in accomplishing a radical cure, that he ad-

* *Traité des Hernies*, p. 118.

vises its employment in every operation for strangulated hernia.*

The plan of removing the stricture, and returning the prolapsed parts without opening the sac at all, ought, I think, to be more frequently adopted than it has hitherto been, although it appears objectionable as a measure of general use, in the operation for strangulated hernia. The particular cases in which this method is advisable, and the reasons, on which its propriety is grounded in such instances, are considered in a subsequent part of this chapter. I am aware that the difficulty of performing any operation should not be urged as an argument against it, if it can be proved to be attended with advantage; yet I really think that the share of anatomical knowledge, which falls to the lot of surgeons in general, is not sufficient to enable them to adopt this mode of operating without danger. If the parts be adherent to each other, or to the sac, they cannot be returned without opening the latter cavity; hence this must be done at last, or else the patient will be left with an

* *Traité des Hernies*, page 191.

irreducible hernia, that will constantly expose him to the risk of a future strangulation. How often does the state of the omentum require that a part of it should be removed, either because it has increased so much in size, as to be irreducible without a very extensive dilatation of the ring; or because it is so altered in structure, that it must necessarily perish. If, in the mode of operating which we are now considering, a portion of this viscus should be returned into the abdomen in a gangrenous state, and slough in the cavity, it would constitute a source of most serious danger to the patient; and very probably cause a fatal termination. The consequences of returning a gangrened intestine into the abdomen must also be considered, as this might very easily take place. It often happens that this change is not indicated by any symptoms, and that it occurs in an early stage of the complaint, and that it is most frequent in small herniæ. The effusion of the contents of the intestinal canal into the abdomen, when the eschar gives way, would be attended with the most dangerous consequences. The chance of a

reproduction of the hernia must be much increased by the practice of leaving the sac unopened; indeed the viscera must necessarily descend into the bag which remains in the groin ready for their reception.

The utter impracticability of the proposal for returning the sac into the abdomen with its contents, except in the most recent cases, accounts sufficiently for it's never having been put in practice, and relieves me from the necessity of considering it more at large.

SECT. V.

Replacement of the protruded Parts.

THE last step of the operation consists in returning the protruded parts, which, if they are sound and not adherent, may be immediately performed. The limb should always be in a bent state during this part of the operation. No condition of the intestine, except actual gangrene, is considered as prohibiting it's replacement.

The strictured part is frequently altered

in colour, and to such a degree, that we should at first be inclined to think it unsafe to return a gut so changed into the abdomen. If this alteration has not proceeded so far as mortification, experience warrants us in replacing the part; and the following case is a further proof of the propriety of this practice.

CASE.

THOMAS LUCAS, a negro, was brought into St. Bartholomew's hospital, with a strangulated bubonocoele, on the morning of the 14th of January, 1807. The incarceration had taken place on the preceding evening at ten o'clock. Cold applications, continued for the space of four hours, and combined with the repeated use of tobacco glysters, having proved ineffectual, the operation was performed by Sir C. BLICKE at twelve o'clock. The case proved to be an intestinal rupture; and the strictured bowel for the length of two inches was, in the whole of its diameter, of the darkest brown and almost black colour: this portion was dis-

tinguished from the sound gut by a defined line. It was returned into the abdomen; but the depth and extent of the discolouration were considered as such unfavourable circumstances, that the patient was not expected to survive. Symptoms of enteritis having appeared within a few hours from the operation, sixteen ounces of blood were taken from the temporal artery;* and the bleeding was repeated soon after to the same amount. With this evacuation were combined the use of warm fomentations to the abdomen, the internal exhibition of a solution of magnesia vitriolata and manna in mint water, and glysters. On the following day thirty-six leeches were applied to the abdomen, and sixteen ounces of blood taken from the arm. These measures subdued the inflammation; but exhausted and weakened the patient to such a degree, that a nutritious diet, together with porter, wine, &c. were required for his support. He had completely recovered, and left the house about the middle of March.

* The blood was drawn from this vessel, in consequence of the superficial veins of the arm being so unusually small, that, although they were opened in several places on both sides, no blood flowed from them.

In order to determine whether a discoloured portion of intestine be actually mortified, we are recommended to press forward the blood contained in the veins; and, if they fill again, it is considered as a proof, that the part still retains its vitality. On the contrary, if it appears that coagulation has taken place, we may infer that the part has gangrened.

The omentum is often so much altered in structure as to render its return improper. The conduct which the surgeon should pursue in the case of a mortified intestine, or of diseased omentum will be considered under separate heads. The finger should be passed in, after the replacement, to ascertain that the ring is free, and that the viscera have completely re-entered the abdominal cavity. In an entero-epiplocele the intestine is generally replaced first, and the omentum afterwards: if any of the mesentery should have descended, that must be returned before the intestine. A distended state of the gut, sometimes forms an obstacle to reduction; if its cavity can be emptied by gentle pressure, it will generally go

up. Let not the surgeon however use violence in such a case, but rather enlarge the division of the stricture. As the omentum always presents first, it generally covers the intestine from our view: hence we should unfold and carefully examine this part, as it often conceals a small portion of gut; and never cut it off until such examination has been effectually made. Instances have occurred in which the omentum has formed a complete bag, including a portion of intestine:* in such a case it must be divided sufficiently to expose the latter part. The possibility of such an occurrence must make us extremely cautious in the removal of a piece of omentum.

The contents of a rupture often adhere to each other, or to the hernial sac. When these adhesions are recent and tender, they may admit of being lacerated by the finger; if they have acquired any firmness, they should be destroyed by the knife.

The intestines seldom adhere together

* RICHTER *Traité des Hernies*, p. 133. The two cases related by Mr. HEY seem to have been in some respects of this kind. *Pract. Obs.* p. 211, and 214

very strongly: the most close and intimate adhesions are those which take place between the omentum and hernial sac. The surgeon should make it a rule to destroy every preternatural connexion before he returns the part; the agglutination of the two sides of a fold of intestine has caused a sufficient obstacle to the passage of the alimentary matter, to induce a fatal termination.*

Reduction may be prevented by adhesion of the parts round the mouth of the sac; as these are not in sight, their destruction is a matter of some difficulty, and attended with danger of wounding the prolapsed parts. This part of the operation may be facilitated by enlarging the incision both of the integuments and ring, so as to bring the adherent part into view. The precaution of introducing the finger, to ascertain that the viscera are completely disengaged, and that the ring is free, which should not be neglected in any instance, is more particularly necessary in the cases which we have now been considering.

I cannot conclude my account of the ope-

* COOPER, page 31.

ration for strangulated hernia, without again cautioning the surgeon to avoid violence in every part of it's performance. He should accomplish the whole by means of the knife, as a clean cut wound unites much more speedily than one in which laceration or contusion have been suffered. If there is not sufficient room for accomplishing any particular purpose, let the incision be enlarged:* if the tightness of the stricture precludes the employment of the finger as a guide for the knife, let a director be used; where there are adhesions, let them be destroyed by the knife. I am convinced that the wound would unite more speedily, if greater attention were paid to this point. There seems to be no reason why its edges, like those of any other recent incision, should not become connected by the adhesive process. Such an event is particularly

* "I have more than once seen the intestine burst by the violence used by the operator to return it." WILMER, p. 3.

Mr. BELL gives a representation of an intestine much injured by the forcible attempts at returning it. *Elements of Op. Surg.* pl. xi.

The intestine has been torn in an attempt to lacerate an adhesion. ARNAUD, p. 317.

desirable in the present case, since numerous facts prove the importance of obtaining a speedy union of wounds, which penetrate circumscribed cavities, in preventing the occurrence of inflammation.

It is generally necessary to retain the lips of the wound in apposition, by means of one or more points of the interrupted suture, particularly when the scrotum has been divided. In the intervals between these, they may be still further approximated by means of sticking plaister. The subsequent management of the wound may be conducted according to the common principles of surgical practice.

SECT. VI.

Treatment after the operation.

EVACUATIONS per anum, and a considerable abatement of the symptoms in general, are the usual consequences of the operation. The former do not always follow immediately; and in all cases it is useful to solicit

the action of the intestines by means of common glysters, and small doses of Epsom salt dissolved in mint water. There is frequently a large collection of fecal matter to be evacuated; and the operation of the purgatives cannot be otherwise than salutary, as it must diminish the tendency to inflammation. A light and sparing diet must be strictly enjoined until the complete recovery of the patient: the intestines remain for some time in such an irritable state, that the least irregularity in this respect brings on considerable disorder, and greatly impedes the progress towards recovery.

Inflammation of the peritoneum is not an infrequent consequence of the operation for strangulated hernia. The contents of the abdomen are often tending to an inflammatory state before the operation, and the wound of itself is sufficient to bring on peritonitis. When a tense and painful state of the abdomen, hiccough, immediate rejection of every thing which enters the stomach, and obstinate constipation indicate the occurrence of inflammation, the most active means must be employed without

delay, and must be followed up until these symptoms are subdued. Our chief reliance will be placed in venesection repeated according to circumstances. Topical bleeding from the abdomen by means of leeches or cupping; warm fomentations to the part, the warm bath, blisters, purgative medicines, and injections must be combined with general blood-letting. Some of these latter remedies only may be sufficient in slighter cases. The patient is often reduced so low by the means employed to subdue inflammation, that it is necessary to support him afterwards by nourishing diet, by wine and cordial medicines.

An irritability of the stomach, and tendency to vomiting remaining after the operation, may be remedied by the effervescing saline draught combined with opium. If diarrhæa comes on in the course of the cure, the latter medicine with cordials deserves our greatest confidence.

The operation for strangulated hernia leaves the patient still subject to a future protrusion of the bowels; which indeed often takes place to a greater extent than

before. Hence a truss must be adapted to the part before the patient leaves his bed, and it must be worn constantly.

SECT. VII.

Proceedings designed to promote the radical cure.

It has been sometimes proposed, to combine with the operation for strangulated hernia, such proceedings as appeared likely to promote a radical cure of the complaint. A ligature has been placed on the mouth of the sac, and the sac itself has been dissected away. The combination of these processes was successful in two instances of irreducible but not incarcerated ruptures operated on by SCHMUCKER.* The latter completely

* *Chirurgische Wahrnehmungen*, vol. II. p. 249, et seq. I should not feel justified in quoting these cases, without making some remarks on the treatment, which was employed. Surgeons of the present day are so fully convinced of the inadequacy of all the means hitherto proposed for a radical cure of ruptures, and of the great danger attendant on their employment, that they never think of doing more

failed in the hands of Mr. COOPER. The ligature, when employed by PETIT, produced such alarming symptoms, that its removal was thought proper; after which they ceased. I have already noticed the proposal of RICHTER; that of scarifying the neck of the sac, in order to produce adhesion of its sides. He seems to have found this successful in practice; and its perform-

than recommending a truss in cases of reducible hernia. The patients, on whom SCHMUCKER operated, had ruptures, which could not be returned, and the existence of which was extremely inconvenient. It may be thought that the surgeon would be justified in operating in such a case, if a person were willing to incur the risk. But this is a doubtful point; and at all events the patient should be most fully apprized of the danger to which he becomes exposed. The experience at present before the public, proves that the performance of the operation for the return of an irreducible hernia, on a person in perfect health, is attended with very considerable risk, equal at least to that of a strangulated rupture. PETIT mentions two cases, in which the event was fatal, and another in which the patient's life was despaired of: *Traité des Mal. Chir.* tom. II. p. 354, and 357. SHARP and ACRELL have recorder similar instances. *Treatise on the Operations*, ed. 10, p. 26. RICHTER *Anfangsgründe der Wundarzneykunst*, vol. V. p. 383. In two cases, operated on by Mr. ABERNETHY, the patients were brought into extreme danger by subsequent peritoneal inflammation.—*Surgical Obs.* pt. 2, p. 5, et seq.

ance cannot apparently be attended with the risk of any unfavourable consequence. One remark may be made on all these methods; viz. that they cannot operate on the cause of the complaint. The frequent return of hernia after the operation must be ascribed chiefly to the dimensions of the ring being enlarged by the incision. This state of the ring will not be at all affected by the obliteration of the mouth of the sac.

SECT. VIII.

Mode of operating on large Herniæ.

OUR proceedings in operating on a strangulated rupture must be somewhat modified by the circumstances of the case. The operation, which has been just described, would not be advisable in a large, old, and adherent hernia. The separation of the preternatural connexions is often extremely tedious and difficult; and the violence, which must necessarily be inflicted in executing this part of the operation, renders the subsequent oc-

currence of inflammation extremely probable. The extensive surface, which must be exposed by laying open the whole of a large hernial tumour, constitutes a source of great danger to the patient, who in these cases is generally advanced in years, and therefore less able to withstand an extensive inflammation and suppuration. In addition to these circumstances, we must recall to our memory the fact stated in the third chapter, of the impossibility, which sometimes occurs, of keeping the returned parts in the abdomen, after they have resided for many years in a hernial sac. We must likewise consider, that the ring is so much dilated, that the hernia will certainly form again, and consequently that there can be no expectation of a radical cure from the operation. These reflections will induce us to adopt the practice of removing the stricture without opening the tumour. The operation will be performed by making an incision of two or three inches in length through the integuments over the abdominal ring. We then dissect down to the fascia, which covers the hernial sac, and make an opening

in that fascia. This allows us to pass a grooved director under the tendon; and the probe-pointed bistoury may be conducted, by means of the groove, to the part that requires division. If great difficulty should be experienced in accomplishing our object in this manner, a small aperture may be made in the sac near the ring, which will enable the surgeon to divide the tendon with ease. When the parts are thus set free, they should be returned into the belly by pressure on the swelling, if adhesions do not prevent this; at all events they generally admit of being replaced in part. A case, which completely illustrates the foregoing observations, is related by Mr. COOPER.* The swelling, which reached half way to the knees, had existed from infancy, and never admitted of complete replacement. The presence of a constant cough rendered it probable, that, if the parts were returned by the operation, they would be forced out again. Mr. COOPER therefore divided the stricture without opening the sac: this enabled him to return a portion of the

* Pt. I. p. 45 and 46.

prolapsed viscera. The strangulation was completely relieved, and in a few days the person, who was fifty-four years of age, had perfectly recovered. The same gentleman has furnished us with an instance of the fatal effects of a different conduct. Strong and general adhesions rendered the separation and replacement of the parts, contained in a large strangulated ventral rupture, impracticable: inflammation speedily followed the exposure of the tumour, and the patient perished in thirty-seven hours.* The following case affords another proof of the advantages of the proceeding, which I have recommended in these instances. The favourable termination must be entirely ascribed to the discrimination and judgment of my respected friend, Mr. CROWTHER, surgeon of Bridewell and Bethlem hospitals, who suggested the mode of operating, and did me the favor of communicating the particulars.

* P. 46.

CASE.

THE operation for strangulated hernia was required in an old and neglected scrotal rupture, which exceeded in size a quart decanter. Mr. CROWTHER, who had just perused MONRO'S* work on the Bursæ Mucosæ, immediately perceived that this was a case precisely adapted for the doctor's method; and accordingly advised its adoption. On making an incision down to the ring, it ap-

* I cannot leave this part of the subject, without performing what seems to me to be an act of justice to the memory of a most excellent surgeon. The honour of proposing the above-mentioned mode of operating belongs exclusively to JEAN LOUIS PETIT, who recommends it particularly in those cases, to which it certainly is the most applicable, namely, large and adherent herniæ.

Dr. MONRO (in his *Description of all the Bursæ Mucosæ*) recommends PETIT'S method, particularly because the intestines are not exposed to the air; in which he seems to conceive that some very poisonous and noxious qualities reside; but he adds, that the proposer of this operation did not understand the reasons on which its utility depends. The reader will be much surprised to find, after this assertion, that the French surgeon mentions it as a great advantage of his

peared, that the contents of the rupture were not pressed on by the tendon of the external oblique. A small opening was therefore made in the sac, in order to ascertain the state of parts within: no sooner was the cavity penetrated, than a bloody fluid issued from the opening with considerable force; a gurgling noise was heard, and the intestine went up spontaneously. A portion of omentum, which remained behind, was reduced without difficulty, and the wound united by the first intention.

The advantages of operating without

method, that the protruded parts are not exposed to the air: (*Traité des Mal. Chir.* tom. II. p. 373.) I do not mention this from attaching any importance to the notion of the deleterious effects of the air, which on the contrary seem to me to be quite imaginary; but merely to prove that those, who are the most zealous in defending their own claims to originality, are not always the most scrupulous in respecting the property of their neighbours.

Dr. MONRO supports his assertion concerning PETIT's ignorance of the true principles, on which the utility of his operation is founded, by a quotation, which the reader must have perceived to have no connexion with the subject; and he will accordingly find that the passage in question is taken from a section of PETIT's work, in which he is speaking on a point altogether different.

opening the hernial sac are so great in all cases, where the tumour exceeds a moderate size, that I would strongly recommend its adoption in all such instances.

SECT. IX.

Operation where the Tumour has not passed the Ring.

IN the case, where the viscera, having entered the upper opening of the ring, are strangulated by its sides, without having descended through the ring of the external oblique; the aponeurosis of the latter muscle must be divided in order to expose the tumour. The opening of the sac, the removal of the stricture, and the replacement of the parts, will be conducted on the same principles as in any other case.

CHAP. VII.

TREATMENT OF THE OMENTUM.

OF all the parts, which form the contents of herniæ, the omentum is found to deviate most frequently from its healthy structure. Indeed it possesses very seldom a perfectly natural appearance, when it has been inclosed for some time in a hernial sac. It becomes considerably thickened below the ring, and hence is firmer to the feel. That part which resides in the neck of the sac is sometimes thickened and indurated, while the portion below retains its natural texture. When it has suffered strangulation for a few days, it often becomes of a dark red or livid colour; and there is an appearance, on cutting it, as if some blood were extravasated in its substance. This I believe is the state which surgeons have generally described under the term of gangrene.

An incision into the part, under these circumstances, is not attended with any bleeding. A portion of omentum, when thus diseased, admits nevertheless of being expanded as in its natural state. But it is sometimes converted into a solid fatty mass, where every vestige of the original structure is lost. I have met with it in an old umbilical epiplocele, forming a mere lump of fat, equal in size to two fists. SCHMUCKER mentions instances, where it has constituted in this manner masses of twelve* ounces, and a pound and a half† in weight. POUTEAU‡ gives a case where forty-five ounces were removed in the operation. The induration sometimes proceeds to such an extent, that its state has been described by the epithets “scirrhou§” and “cancerous||.”

To return a portion of omentum, when

* *Vermischte Chirurgische Schriften*, vol. III. p. 197.

† *Ibid.* vol. II. p. 56.

‡ *Ouvrages Posthumes*, vol. III. p. 173. ARNAUD even mentions its forming a mass of 8lb. in weight in an exomphalos, *Mémoires de Chirurgie*, tom. II.

§ COOPER, page 32.

|| POTT's *Works*, vol. III. p. 253.

diseased in the manner which we have now described, would be a very bad practice, for two reasons. It would often require so large an incision of the ring, as to weaken the parts considerably, and thereby encrease the chance of a future protrusion. The presence of such a diseased mass in the abdomen would also excite inflammation in the surrounding parts, and thereby bring the patient into a state of danger, not less than that from which the operation had relieved him. This at least was the event in a case recorded by Mr. HEN* : the subsequent symptoms and the dissection clearly shewed that the patient's death arose from inflammation excited by the replacement of a diseased mass of omentum. In another case, recorded by the same surgeon†, a diseased portion of this membrane, which had been returned into the abdomen, was found upon dissection completely mortified; and would certainly have caused the patient's death, even if the returned intestines had not become gangrenous.

* *Practical Observations*, p. 172.

† *Ibid.* p. 217.

Various proceedings have been employed in the management of such diseased pieces of omentum, as surgeons have thought it wrong to replace. They have placed a ligature on the root of the altered part, removed the substance below this, and then returned the remainder into the cavity of the belly, retaining the ends of the ligature on the outside. It happens too frequently in the practice of surgery, that an unfounded fear of hemorrhage causes the ligature to be used under circumstances, where the knife alone would answer every reasonable purpose. It must be some vain apprehension of this kind, that has induced operators to tie the omentum, previously to retrenching the diseased part. The consequence of this practice is an inflammation of the omentum, extending within the abdomen to the stomach and transverse arch of the colon. This is the circumstance, which, represented in several cases by the best surgical writers, militates so strongly against including the omentum in a ligature; and a case, which I shall presently produce, tends to reprobate it, if possible, still more. What

can indeed be more contrary to reason, than the practice, which we are now considering? The symptoms, which oblige us to operate, arise from the pressure of the ring upon the omentum: no sooner have we freed the part from this stricture, than we subject it to a more close one: for the ligature does what the ring did before; and evidently produces the effect more completely. If strangulation of the omentum by the ring may cause dangerous and mortal consequences, how can we expect that these should not follow when the ligature is the cause of stricture?

CASE I.

A WOMAN, not less than sixty years of age, was sent into St. Bartholomew's Hospital, May 28, 1800, by Mr. BLAIR, with symptoms of a strangulated umbilical hernia. According to her own history she had been pregnant about twenty-three years previous to her present indisposition. When, as she was suffering much from labour-pains, a

tumour made its appearance at her navel. At first it was about the size of an orange, but never being sustained by bandage, it increased slowly till it acquired a very considerable magnitude. It had continued for that long space of time without any particular inconvenience to her, if we except those occasional attacks of colic, diarrhæa and vomiting, to which most persons (especially those advanced in life) afflicted with this kind of hernia, are so peculiarly liable.* Eleven days, however, before her admission into the hospital, the tumour already very large, grew still larger, became extremely painful and tense, and a tenderness extended over the whole surface of the belly; all this while she had had no evacuation by stool, there was continual nausea and vomiting; and her pulse was frequent and small, with thirst and other febrile symptoms.

Surgeons are well informed that the existence of an epiplocele (as it will afterwards appear that this originally had been) constantly renders persons so afflicted very sub-

*POTT vol. II. p. 167.

ject to the protrusion of more of the contents of the abdomen. This was precisely the unfortunate circumstance that had happened in the present instance ; for though our patient had lived tolerably comfortable for twenty-three years, with almost the whole of the omentum in a hernial sac, yet in the end a small piece of the intestine happening to slip down, converted the disease into an entero-epiplocele, and being in an incarcerated state, gave rise to all the urgent symptoms of the last eleven days.

It must be acknowledged, that in many cases of exomphalos it frequently becomes a matter of the greatest difficulty to ascertain, whether the bad symptoms arise from strangulation, or from other affections of the abdominal viscera, with which persons, having such herniæ, are so much troubled; but in the one before our consideration the difficulty appears to have been less: for the sudden increase and inflamed state of the tumour, the long duration of the symptoms, and particularly of the suppression of stools, sufficiently indicated the nature of the case.

The operation was performed in the evening, and the division of the integuments and hernial sac brought into view a very large mass of thickened and indurated omentum, which adhered so firmly to the whole internal surface of the sac, that a great deal of dissection was necessary to separate them. Beneath the omentum a strangulated portion of the jejunum was discovered, about five inches in length. The intestine was returned into the abdomen without making any division of the parts through which it had come out, and the large mass of diseased omentum, that composed the great bulk of the hernia, remained at the disposal of the surgeons.

The operator placed a ligature round the root of the protruded omentum. The great sympathy between this part and the stomach was conspicuous to every observant spectator; at the moment that the ligature was drawn the patient's agony was heightened, her vomiting instantly recurred. But this momentary increase of pain and sickness is only a matter of trifling importance, when we contemplate in a comparative view other

more permanently pernicious and frequently mortal effects of this practice. It is the succeeding inflammation of the epiploon that ought principally to excite alarm.

The operator next proceeded to amputate what remained of the omentum below the ligature, which might be about three-quarters of all that was protruded, and the rest was left with the ligature in the hernial sac unreduced. The patient, soon after the operation, had stools, but the pain at her stomach was excruciating, and her vomiting soon returned and became incessant: her nights were restless, and finally, after lingering eight or nine days, she died: a little before her death a portion of the integuments, which formerly contributed to envelop the hernia, sloughed. Her body was examined in the presence of many of the pupils of the hospital, when the usual and fatal effects of the ligature were seen. Within the abdomen the omentum was in a gangrenous state, and inflammation had invaded the colon; all the rest of the abdominal viscera had a healthy appearance.

CASE II.

I HAVE lately seen another instance, in which a large mass of omentum, contained in a strangulated scrotal rupture, was included in a ligature. The patient died so soon after the operation, of inflammation of the bowels, that the effects of the ligature could not be sufficiently displayed: yet the state of parts, as ascertained by dissection, renders it probable that the consequences of this practice would have been very injurious had the patient survived. The omentum was collected by the ligature into a thick mass, tightly stretched over the intestines, and manifestly dragging on the stomach. If it had become fixed by adhesion in this state, may we not reasonably conclude that the irritation of this unnatural connexion would have produced the most distressing effects on the stomach? The part, round which the ligature was placed, had ascended about three inches within the abdominal

ring. Hence the portion of this viscus below the ligature would have sloughed within the abdomen, and the patient must have encountered no trivial risk from this source.

An observation, published by POUTEAU, shews us how much danger we ought to apprehend from including the omentum in a ligature; and, as it supports the truth of the opinions, which I have delivered on this subject, it may be proper briefly to annex the particulars. The operation for bubo-nocele had been performed on a young man twenty-five years of age; it was not difficult, after releasing the intestine from stricture, to return it, apparently in a sound condition. A portion of omentum, which had accompanied it, was too large to be replaced without carrying the incision too far; wherefore POUTEAU determined to employ the ligature, and extirpate it. Soon after the operation, the vomiting, caused by the strangulation, ceased, and the patient had stools; but in a short time he complained of an acute pain at the stomach: the whole surface of the abdomen became extremely

tender, and he expired thirty-six hours after the operation, although all the medical assistance had been afforded him, that his situation demanded. On opening the body, the omentum was found sloughy through its whole extent, and had contracted adhesions to the peritoneum.*

In the third volume of Mr. POTT's works we find a relation of three† cases, where the omentum inflamed and became gangrenous in consequence of a ligature upon it; all which terminated in death. The mind of this celebrated surgeon was so deeply impressed with the fatality of the practice, that he declares his intention never to employ the ligature again.‡ Two other examples of the fatal effects of the ligature may be found in the third volume of the *Memoires de l'Academie*.§

* SABATIER *de la Médecine Opératoire*, tom. I. p. 23.

† Page 259—266.

‡ “As I am by repeated experience convinced, that a portion of the omentum, however large, may be extirpated with perfect safety, without being previously tied, I shall never practise nor advise the ligature,” POTT's *Works*, vol. III. p. 259.—See also his remarks on the same subject, vol. II. p. 133.

§ Page 73 and 399, 4to. edition.

It has been a question in the academy of surgery at Paris,* whether, before returning the omentum into the abdomen, there was any necessity for tying its cut edge. Many observations on the human subject, and several experiments on dogs shewed that no danger arose from its being replaced without a ligature, and that the practice of tying it often produced injurious consequences. This our illustrious countryman SHARP had already determined by his own experience; he had constantly practised the excision of the omentum without a ligature, having found the apprehension of bleeding perfectly groundless.† We must then conclude, that, if SHARP and POTT, two of the ablest surgeons this country can boast of, never experienced any trouble from hemorrhage

* See two memoirs on this subject, in the third volume of the *Memoires de l'Academie*, by Mr. VERDIER and Mr. PIPELET. BOUDOU, chief surgeon of the Hôtel Dieu, had so often experienced the bad effects of the ligature, that he was induced to give it up, tom. IV. p. 316. Mr. CAQUE, surgeon to the hospital at Reims, had extirpated the protruded portion of omentum, and returned the remainder without any ligature, in nine cases, with success, *ibid.* tom. III. p. 407.

† *Critical Inquiry*, page 35.

of the omentum when no ligature was used; if the most enlightened foreign practitioners have met with the same success; and if such pernicious and fatal consequences do follow tying the omentum, as there is abundant evidence to prove to be a fact; certainly, a continuance of the practice can only discover a backwardness among surgeons, to listen to the instructions of experience, and a reluctance to countenance the most valuable improvements.

But let it not be supposed that I mean to advise the returning of the part into the belly, when there is any bleeding from its cut edge. These objections are only applicable to the practice of tying the omentum in a mass: they do not affect the very necessary and proper precaution of securing individually, by small ligatures, any vessels which afford hemorrhage. When this has been done, the part may be returned into the cavity, the ends of the ligatures being retained on the outside.

Some surgeons have recommended that the omentum should be left in the wound,

particularly in an old hernia, where the parts have been long down. Cases are recorded, which shew the safety of this practice, and which prove that granulations extend over the omentum, and that a firm cicatrix ensues.* This practice, which I cannot speak of from my own observation, does not appear to me to deserve recommendation. It is attended with no particular advantage, but certainly exposes the patient to the possibility of ill consequences. The omentum left in the wound must be liable to injury, inflammation, or disease; and hence arises a source of danger to the patient. Unnatural adhesions, formed by this part, have greatly impaired the functions of the stomach. Cases are recorded, where the unfortunate patient has never been able to take more than a certain quantity of food without bringing on instant vomiting; and even where it has been necessary for all the meals to be taken

* HEY, p. 180 et seq. CHOPART and DESAULT state, that when the omentum is irreducible merely from its bulk, they leave it in the wound, and it gradually retires into the abdomen—*Traité des Mal. Chir.* tom. II. p. 269.

in the recumbent position, with the trunk curved and the thighs bent.* To avoid the possibility of such afflicting consequences, we should, after removing any diseased portion, carefully replace the sound part of the omentum in the abdominal cavity, that no obstacle may exist to its regaining that situation, in which its connexions with the stomach and colon would naturally place it.

Since then the practice of removing a diseased portion of omentum, of securing the bleeding vessels, and of returning the remainder into the abdominal cavity, has never produced any injury to the patient, nor is likely to be followed by any ill consequence; it must, in the present state of our knowledge, be considered as the most advisable treatment.

* GUNZ, *Obs. Anat. Chir. de Herniis. Mémoires de l'Académie de Chirurgie*, tom. III. p. 406.

CHAP. VIII.

TREATMENT OF HERNIA WHEN THE INTES-
TINE HAS MORTIFIED.

SECT. I.

Symptoms of Mortification and Prognosis.

THE contents of a hernia are sometimes affected with gangrene, when no circumstance existed previously to the operation, which could lead to the suspicion of this occurrence. Here the integuments and hernial sac are perfectly healthy. It happens however, more frequently, that the superincumbent parts are affected, in consequence of the mortification of the hernial contents; and the integuments are largely included in the sloughs.

The occurrence of mortification is gene-

rally shewn by the tumour losing it's tension, and becoming soft; the integuments, which are very red, become livid, and afterwards black in one or more spots; the cellular membrane is emphysematous; the pain, vomiting, and hiccough cease; the pulse sinks; lastly, the integuments give way, and a discharge of wind and fecal matter in a highly fetid state ensues. Some times the rupture spontaneously recedes, and fetid stools are passed. The patient is generally exhausted before the complaint has proceeded to this extent; but the powers of nature occasionally support him through this dangerous state, and even effect a complete recovery. Though the numerous instances of these events, which occur in the records of surgery, should lead us to persevere in the use of such means, as may be likely to aid the salutary operations of nature, they ought not to raise any sanguine hope of similar results in general practice, nor lead us to give any other prognostic, but such as would prepare the minds of friends for the fatal termination.

The probability of a favourable event is

much greater in some kinds of rupture than in others. It has often happened, that the strangulation has included a part only of the diameter of the gut. In several cases of this description the feces have only been discharged in part through the mortified opening: this quantity has diminished gradually as the wound healed, and the patient has completely recovered.* If the gangrene have only attacked one or more small spots, the event of the case may be similar. When the contents of the hernia have consisted of the cæcum with its appendix, the mortification of these parts has affected the natural course of the feces but little, and a perfect cure has rapidly taken place.† The aid of surgery can effect but little in these cases: we must carefully abstain from all means that might interrupt the salutary operations

* Many such instances are related by Mr. LOUIS in his "*Memoire sur la cure des Hernies Intestinales avec Gangrene,*" *Memoires de l'Acad. de Chir.* tom. III.—See also *Lond. Med. Journal*, vol. X. p. 72.

† *Edinburgh Med. Essays*, vol. V. art. 33; and *London Med. Obs. and Inquiries*, vol. III. art. 8; HEX'S *Pract. Obs.* p. 162 et seq. *Edinburgh Med. and Surg. Journal*, vol. II. p. 313.

of nature. The intestine is adherent to the parietes of the abdomen, behind the ring; these adhesions are of great importance in the subsequent progress of the cure, and should therefore never be disturbed. If the intestine has not already given way, we may remove the stricture: where an opening has taken place, we may make such incisions, through the sphacelated parts, as will provide a free exit for the fecal matter. In either case, mild purgatives and glysters will be proper to unload the bowels, and to determine the course of the feces towards the anus. The use of both these means with the latter object, constitutes a very important part of the treatment of all cases of mortified intestine.

SECT. II.

*Treatment where a small Spot only has
mortified.*

WHEN a larger portion of intestine has descended, it may be affected with gan-

grene, in one or more spots, the rest remaining comparatively sound; or it may have become mortified through a greater or less extent of its whole diameter. Various proceedings have been adopted in the former case. We are recommended to leave the gut in the wound, after removing the stricture; in addition to this, some have advised excision of the mortified part.* Others have returned the intestine, retaining it in the neighbourhood of the ring, by a ligature passed through the mesentery. The fear of an effusion of fecal matter into the cavity of the abdomen, on the separation of the slough, formed the objection to the replacement of a mortified portion of gut: and the intent of the ligature placed in the mesentery was, to prevent the possibility of this much-dreaded effusion, by keeping the sphacelated part opposite the ring. The foundation of these apprehensions must be carefully examined, before we can fairly appreciate the treatment which they have suggested. Two questions here offer themselves for discussion: whether a replaced

* RICHTER *Tr. des Hernies*, p. 150.

portion of intestine leaves the ring, and moves to some distant part of the cavity? and whether, on the separation of the sphacelated part, an effusion into the abdomen may be expected?

The inflammation, which precedes the mortification of the intestine, is found to extend along the canal, and to agglutinate the neighbouring parts to each other, and to the abdominal parietes. Thus the returned gut is mechanically confined to the neighbourhood of the ring, and a complete barrier is opposed to it's removal from that part. If adhesions had not formed previously to the operation, which probably is very seldom the case, there is every reason to suppose that they would take place afterwards; for it is invariably found, when a fatal termination enables us to ascertain the state of the parts after death, that the replaced viscera are close to the ring, and are adherent to the surrounding parts. DESAULT states the result of his experience on this point in the most unqualified terms; he has learned from dissection that the portion, which

formed the hernia, never recedes from the ring.* The authority of DELAFAYE may be cited in further confirmation of this point. “When the intestine sloughs after being returned into the abdomen, we might,” says he, “apprehend an effusion of feces into the cavity; but this fear is groundless as the intestine remains opposite the ring: accordingly the contents of the bowels come through the wound some days after the operation.”†

When it is proved, that the returned part remains close to the ring, we may lay aside all fear of effusion into the abdomen. The wound of the operation affords the most ready exit for the fecal matter, which never penetrates into the cavity. We should not, however, be justified in expecting the feces to spread over the abdomen, even if the intestine were not exactly against the ring. PETIT,† in his excellent memoirs on Effu-

* *Parisian Surgical Journal*, vol. II. p. 366.

* *Cours d'Operations de DIONIS*, ed. V. p. 350, note a.

† *Memoires de l'Academie*, tom. I. et II. see particularly the “*Essai sur les Epanchemens du bas ventre*” in the 2nd vol.

sions, has long ago refuted the commonly received notions on this subject, both by facts and reasoning: he has clearly shewn, that the contents of the intestine, or blood, shed into the abdomen, do not spread loosely over the cavity; that the pressure of the respiratory muscles affords the obstacle to such an expansion; that the effused matters, being evacuated in opposition to considerable resistance, are collected in one spot, to which they become confined by the inflammatory agglutination of the contiguous parts, and where they form, what the French call a *depôt*. We may then safely conclude, as the annexed cases will most clearly demonstrate, that the alimentary matters, effused from a mortified intestine, will find their way through the wound, and not be spread over the cavity.

If then, we have no reason to fear, either that the intestine should move from the ring; or, that it's contents should be effused into the abdomen, there can be no doubt as to the conduct required, where a portion only of the gut is affected with gangrene: we should replace it in the cavity, with the

mortified portion towards the wound, and await the result of the operations of nature without interference. In these, as in all cases of mortified intestine, the most rigid attention to diet is indispensably necessary. Here too, as in the last mentioned case of mortification, the use of purgatives and glysters is required for the same reasons as were then stated. The termination of the case will be influenced by various circumstances, which can be but very little modified by any efforts of the surgeon. It is an unfortunate circumstance when the opening is in the upper part of the intestinal canal.* The most favourable termination is, when the alimentary matter, after finding its way for some time, either wholly or in part, through the wound, gradually resumes its natural course. The powers of

* In a case where every thing was going on well, the patient died from want of nourishment; the opening having taken place in the jejunum, COOPER, pt. I. p. 33. In a case of this kind the surgeon should omit nothing which offers a probability of relieving his patient. The most nutritive kind of food, such as strong soup, jellies, &c. should be taken frequently in small quantities, in order to afford an opportunity for the greatest possible absorption. Broth and milk may also be thrown up per anum.

the patient may sink under the disease, or he may recover under the disgusting and terrible necessity of voiding his excrement for ever after through the wound.

That the conduct, which has been here prescribed, may be followed, not only without any ill consequences, but with the most complete success ; that the contents of the intestine, when the dead part gives way, come through the wound, instead of spreading over the cavity ; and consequently that the replaced part does not quit its position behind the ring, are points completely proved by the following case.

CASE.

EDWARD TUBBS, a sailor, 22 years of age, was admitted into St. Bartholomew's Hospital under the care of Mr. LONG, with a strangulated scrotal rupture. The operation was delayed longer than it would otherwise have been, by the patient's refusing for some time to submit to it: but there were no symptoms nor appearances indicating the

occurrence of mortification. When he at last consented, the contents of the rupture were found to consist of what has been termed a knuckle of small intestine. Mr. LONG observed, when he opened the sac, that the contained fluid had a fecal smell. The ring, which formed a very close stricture, had made a manifest impression on the gut; and a small pin-hole appeared in this part, through which the alimentary matter came. A broad patch of the posterior part of the intestine was manifestly gangrenous; and a smaller portion of the convexity of the fold appeared in the same condition. The gut was returned;* and evacuations were procured per anum, by means of glysters and purgatives. In three days the contents of the bowels began to be partly discharged through the wound; and in a short time they all came that way. The evacuated matter was a light yellow frothy.

* I have been informed by Mr. COOPER, that in a case operated on at Guy's Hospital, where a small opening was formed in the intestine, the aperture was tied with a fine ligature, previously to it's being returned; and that the patient recovered.

fluid, mixed with flakes of a more consistent kind. It had no fecal smell; and was discharged in less than ten minutes after drinking. It caused great inconvenience to the patient by excoriating the groin; and this was remedied in great measure by fastening a piece of moistened bladder with sticking plaister close to the edge of the sore, and allowing the discharge to run over this. The general health was perfectly good. In three weeks he began again to have motions per anum, which encreased in quantity, while the discharge by the wound was diminished; and this consisted at last of a mere froth. In a very short time the wound had completely cicatrized, and the man was discharged perfectly well.

The fifty-ninth observation of LE DRAN* is a case in which the intestine gave way on the eleventh day after its replacement in the abdomen. The feces came through the wound, and the patient recovered.—“ Experience” he says “ has convinced me, “ that the ligature in the mesentery may

* *Observations in Surgery*, p. 200.

“ be omitted when the intestine has opened
“ or is ready to open by mortification; be-
“ cause the inflammation preceding it al-
“ ways produces an adhesion of the in-
“ testine.”

In an instance mentioned by Mr. COOPER,* the intestine was replaced, without being confined by a ligature. The feces made their appearance after ten days; and passed for eleven weeks, partly through the wound, partly per anum; at the end of this time their natural course was re-established. Two other facts, in proof of this point, are furnished by PETIT†; and SHARP‡ speaks in general terms of the great number of cases where the feces have been safely discharged through the wound from a gangrened intestine.

I shall content myself with adding to the evidence already adduced, the testimony of DESAULT, whose experience on this point is completely decisive. In operating on an hernia, he found an eschar of an inch in

* Pt. I. p. 35.

† *Memoires de l'Acad. de chir.* tom. II. p. 93 and 94.

‡ *Critical Inquiry*, p. 42.

diameter on the intestine. He returned this part, and no subsequent symptoms occurred to denote the separation of the slough. He conceives that the inflammation of the part surrounding the eschar, agglutinated it to the parietes of the abdomen; and that the slough passed along the intestinal canal. But it is not on the event of a single case that he rests the propriety of this practice: he recommends it from the favourable result of his general experience. He has relinquished the loop of thread through the mesentery; “being convinced by experience, “and particularly from dissection, that the “portion which forms the hernia, never “recedes from the ring, and that there is “no reason to apprehend an effusion into “the abdominal cavity on the separation “of the eschar*.”

♦ *Parisian Surgical Journal*, vol. II. p. 366.

SECT. III.

Mortification of the whole diameter of the Intestine.

IN the case of mortification of the whole diameter of the intestine, we are directed to cut away the dead part, to introduce the superior extremity of the gut into the inferior, and to sew them together. Systematic writers have employed themselves in devising various methods for uniting the divided ends. They have debated whether they should be simply sewed together, or supported by substances of some solidity, in order to prevent any subsequent contraction at the point of union; and disputes have arisen, whether a portion of an animal's trachea, a cylinder of varnished card, or of isinglass, were the most advantageous method of effecting the desired purpose. These expedients are described with such minuteness and formality, that an inexpe-

rienced person might suppose they had been all tried in actual practice. They have, however, fortunately been very seldom employed*.

I have no hesitation in rejecting entirely all such proposals. By drawing the intes-

* Some cases, in which the divided intestine has been successfully united by means of sutures, have been laid before the public. RAMDHOR, who first proposed the introduction of the superior into the inferior end of the gut, cured a patient by that process, after the removal of a piece of intestine of a foot in length. (See a dissertation of MOEBIUS in HALLERI *Disp. Anat.* tom. VI. also HEISTER *institut. chir.* p. 817.) A case of a similar kind is recorded in the *Mem. de l'Acad. de Chir.* tom. III. p. 188: another in the *Journal de Medecine*, tom. XXIII. p. 361; and a fourth in SCHMIDT *Dissert. de Ileo*, (see CREUTZENFELD *Biblioth. Chirurg.* p. 844.) In the only instance which I know of its being attempted in this country, it failed completely, although tried twice—see the Case quoted below.

The favourable result of several experiments on the union of divided intestines by means of sutures, in dogs, has afforded an argument for adopting this practice in the human subject. But the cases are not sufficiently analogous to warrant this mode of reasoning. The different effects of injuries and operations on animals and the human subject; the very different state, both of the constitution and part in a healthy dog, and in a man labouring under a strangulated rupture; and the different structure of the intestines in the two cases, render it impossible for us to apply inferences drawn from such experiments to the treatment of a mortified intestine,

tine out of the cavity, in order to remove the dead part, the adhesion behind the ring, on which the prospect of a cure chiefly depends, must be entirely destroyed; and new irritation and inflammation must be unavoidably produced by handling and sewing an inflamed part. We accordingly find, that in one of the very few instances, where suture of the intestine has been practised in the human subject, the surgeon was compelled to remove the threads; and that a second trial on the same patient met with no better success*.

When the intestine above and below the mortified part is not adherent, LA PEYRONIE has recommended, after the removal of the dead portion, that a ligature should be placed in the mesentery so as to draw this part into a longitudinal fold, and there-

* COOPER, Pt. I. p. 36. In the second part of his work Mr. COOPER has mentioned two other instances, in which suture of the intestine was practised. In one of these the feces came through the wound from the time of the operation; in the other no discharge took place, either per anum or through the groin, till some time after the operation, when an evacuation through the wound greatly relieved the patient, p. 30 and 31.

by approximate the two ends of the gut. He fastens this ligature on the outside of the wound, in such a manner, 'as to retain the open extremities near the ring. The successful event of some cases treated on the above plan, seems to justify the principles on which it is founded*. If indeed it's employment be restricted to those cases, in which the intestine is perfectly inadherent, (which are, I am convinced, of extremely rare occurrence) it is not liable to any objection; and certainly possesses the merit of retaining the ends of the intestine, in such a relative position, as must facilitate their union.

A different treatment has been proposed by LITTRE†; he retained the superior extremity of the intestine in the wound, and tied the lower. This plan has gained the approbation of Mr. LOUIS‡, who considers it as preferable to the proceeding of LA

* *Mémoires de l'Acad. des Sciences*, année 1723. *Mémoires de l'Acad. de Chir.* tom. I.

† *Mémoires de l'Acad. des Sciences*, année 1700.

‡ *Mémoire sur la cure des hernies intestinales avec gangrène* in the *Mém. de l'Acad. de Chir.* tom. III.

PEYRONIE. I cannot think a surgeon justified in directing his treatment expressly to the formation of an artificial anus; and thereby depriving his patient of all chance of that entire recovery, which the powers of nature have accomplished in so many instances. This practice, in it's complete success, can only gain the credit of rendering a person disgusting to himself, and to those with whom he associates. It really becomes a question, whether life itself be desirable, if burthened with such an afflicting infirmity as the discharge of the feces through the groin.

After thus objecting to the various modes of treatment, which have been proposed for a mortified intestine, it remains for me to mention the conduct which a surgeon should pursue in such a case. This is to dilate the stricture, and to leave the subsequent progress of the cure entirely to nature. The sloughs will be cast off; the ends of the gut are retained by the adhëive process in a state of apposition to each other, the most favourable for their union; the wound contracts, and often completely closes, so that

the continuity of the alimentary canal is perfectly re-established. The interference of art can only be prejudicial in this process. It is difficult for us to conceive, how the intestinal canal can become restored, after considerable portions of it have perished: yet indubitable proofs of this fact exist, and induce us to place confidence in the resources of nature. Almost all the numerous instances of recovery from mortified hernia, which are recorded in the annals of surgery, took place where the surgeon was contented to remain a quiet spectator of the process, without interfering with any artificial means of uniting the divided intestine.*

* PETIT *Traité des Maladies Chirurgicales*, tom. II. p. 317, et 399.—*Supplément au Traité de PETIT*, p. 116,—POTT'S *Works*, vol. III. p. 319.—*Memoires de l'Academie de Chirurgie*, tom. I. p. 603; tom. III. p. 178 et 181.—*Memoires de l'Acad. des Sciences*, année 1735.—MAUCHART, *Dissert. Chirurg. de Epiploenteroceles crurali incarceratâ, sphacelatâ, &c.* in HALLER, *Disput. Chirurg.* tom. III.—HEISTER de *Herniâ incarceratâ, suppuratâ, sæpe non lethali*, *ibid.*—*Journal de Medecine*, tom. XXIII. p. 274; tom. XXXVI. p. 68.—BRAMBILLA in *commentar. Bononiens*, tom. VI. p. 79.—WILMER'S *Practical Obs. on Hernia*, p. 82, &c.—GOOCH'S *Surgery*, vol. II. p. 197.—COOPER on *Inguinal Hernia*, p. 33.

I have only to remark, that in almost all the instances, re-

Perhaps, the only step, which would be justifiable, is that of making an incision in the sphacelated part; this will promote the evacuation of the alimentary canal, and afford considerable relief.

I cannot conclude this part of the subject, without adducing, in support of the practice here recommended, the opinions of two celebrated men, whose acknowledged abilities and extensive experience entitle them to the greatest attention. My readers will be satisfied on this point, when I mention the names of J. L. PETIT and RICHTER: and as their works are not in general circulation in this country, I shall extract the passages to which I allude. After mentioning a valuable and instructive case, PETIT proceeds, “ Cette observation, et quelques autres, que
“ j’ai rapportées ci-dessus, prouvent bien
“ que les guerisons, qui paroissent miracu-
“ leuses, sont dûes a la nature plus qu’a

corded in the works which I have now quoted, two or three inches, or still longer portions of the intestinal canal had been destroyed by the mortification, and they all recovered completely. The number of citations might be easily increased, but these are sufficient for my purpose.

“ l’art. Heureux les malades, qui tombent
 “ entre les mains des chirurgiens bien con-
 “ vaincus de cette verité; ceux-ci s’attach-
 “ eront seulement a éloigner tout ce qu’ils
 “ croiront pouvoir troubler ou interrompre
 “ la nature dans ses fonctions, et n’en au-
 “ ront pas moins de gloire.”*

“ There can be no doubt,” says RICHTER, in his elements of surgery, “ that the sur-
 “ geon acts most prudently in leaving the
 “ union of a divided intestine entirely to
 “ nature; and that all the artificial me-
 “ thods, which have been hitherto recom-
 “ mended, are much better calculated to
 “ disturb than to aid her salutary opera-
 “ tions.”†

There are but few observations to be made as to the general management of patients labouring under mortified herniæ. The utility of mild purgatives and glysters, and the necessity of a strict attention to diet have been already pointed out. The powers of the patient are sometimes so reduced by the disease, that he requires to be supported by a

* *Traité des Mal. Chir.* tom. II. p. 403, 404.

† *Anfangsgründe der Wundarzneykunst*, vol. V. p. 346.

nourishing kind of food; here strong soups and broths, sago, &c. and even wine may be necessary. Bark and cordial medicines may be combined with these. A common poultice, with occasional fomentations, constitutes the best local application; the necessary attention to cleanliness requires that it should be often renewed. When the sloughs have separated, and the dimensions of the wound have diminished, its entire closure may be favoured by approximating the edges with sticking plaister, and making pressure on the part.

SECT. IV.

Artificial Anus.

THE patient, who has recovered from a mortified hernia, with the natural passage of the feces restored, still remains exposed to considerable danger from disorder of the bowels. He should pay the strictest attention to the quantity and quality of his food, since irregularity in these points has some-

times led to fatal consequences. The gut has been known to burst at the point of union, long after the complete recovery, and death has been the consequence.* A patient under these circumstances might perhaps be relieved if the surgeon were bold enough to undertake a hazardous operation. In a person who had recovered from a mortified hernia, the feces ceased to pass per anum; nor could any stools be procured: the belly became distended. The surgeon made an incision into the intestine, and by extracting from it's cavity a foreign body, formed on a plumbstone, completely relieved his patient.†

If the complaint terminates in the formation of an artificial anus, we must endeavour to alleviate those distressing inconveniences, which arise from the involuntary discharge of wind and feces through the new opening, by supplying the patient with an apparatus, in which these may be received, as they

* *Memoires de l'Acad. de Chir.* tom. I. p. 171—175.

† *Journal de Medecine* for June 1787. The case is also annexed by the French translator of RICHTER to the *Traité des Hernies*, p. 306.

pass off. An instrument of this kind, the construction of which appears very perfect, is described by RICHTER* from the *Traité des Bandages* of JUVILLE. The patient will be best enabled to adapt any contrivance of this sort to the particular circumstances of his own case. It has been found in some instances, that a common elastic truss, with a compress of lint under the pad, has been more serviceable than any complicated instrument† in preventing the continual flow of feculent matter from the artificial opening.

It happens, not unfrequently, that a prolapsus of the intestine takes place at the artificial anus.‡ It follows necessarily in this case that the gut must be inverted; so that it's villous coat constitutes the exterior surface of the tumour. This prolapsus may take place either from the upper or lower end of the intestine; or from both.

* *Anfangsgründe der Wundarzneykunst*, vol. V. § 427.

† *Parisian Journal*, vol. I. p. 193.

‡ There is a valuable memoir on these protrusions by Mr. SABATIER, in the fifth vol. of the *Memoires de l'Academie*; to which the reader is referred for a more detailed account of the subject.

In the first of these cases the feces pass from the middle of the swelling; in the second from the basis of the tumour. The complaint may come on gradually, and as it were spontaneously; or it may be caused on a sudden by any effort, as violent coughing, straining at stool, &c.

These protrusions do not cause in general any very serious inconvenience, as they can be replaced at pleasure.

CASE.

I know a patient with an artificial anus, in whom the gut often protrudes to the length of eight or ten inches, at the same time bleeding from it's surface. This is attended with pain, and compels him to lie down; in which position the intestine recedes. The patient has now discharged all his feces at the groin for fifteen years; and has enjoyed tolerable health and strength during that time. His evacuations are generally fluid; but sometimes of the natural consistence. Whenever he retains his urine, after feel-

ing an inclination to void it, a quantity of clear inoffensive mucus, like the white of an egg, amounting to about four ounces, is expelled from the anus: and this may occur two or three times in the day.

Such protrusions may, however, become actually strangulated, so as to require a surgical operation for the removal of the stricture;* and they may, by acquiring a large size, be attended with considerable danger. Hence we should always endeavour to prevent their occurrence, when a disposition to their formation seems to exist, by the use of a steel truss, which should indeed be worn by the patient independently of this circumstance. If the tumour has become irreducible by the hand, it's replacement may be attempted by keeping up a constant pressure on the part, the patient being at the same time confined to

* SCHMUCKER *Vermischte Chirurgische Schriften*, tom. II. Two cases, which terminated fatally from this cause, are mentioned by SABATIER in the memoir above quoted. See also LE BLANC *Précis d'Operations de Chir.* tom. II. p. 445.

bed. By these means DESAULT* returned a very large prolapsus; and by pressure on the opening after the replacement, the feces passed entirely by the anus, although for four years they had been voided only through the wound.

It happens sometimes that the wound closes in a case of mortified hernia, with the exception of a small fistulous aperture, which gives passage to a thin and clear yellow fluid, in small quantities, and cannot be healed.

Cases have occurred where no mortification of the bowel was discovered by the operation, but the feces have nevertheless come through the wound, at some distance of time from the operation. The following case, which happened at St. Bartholomew's Hospital in the last winter, affords an example of this kind.

* *Parisian Journal*, vol. I p. 178 et seq. The account of this case, which does great credit to the genius of DESAULT, should be perused by every surgeon. Another successful case is mentioned in p. 370 of the same volume.

CASE.

A WOMAN, about sixty years of age, was brought to the hospital for a bubonocoele, which had been strangulated two days. The urgent nature of the symptoms induced Mr. RAMSDEN to operate in about two hours after her admission. The escape of a large quantity of turbid and fetid fluid, when an opening was made in the sac, led Mr. R. to fear that he had injured the intestine, but the subsequent complete exposure of the part proved this apprehension to have been groundless.—The gut, which was much discoloured, was returned without difficulty, but seemed not to have completely re-entered the abdominal cavity. On passing the finger as high as the incision would admit, it did not fairly reach the abdomen, but conveyed an idea as if the intestine, although free from stricture, were contained in a peculiar membranous bag. The patient was found in the evening, with great pain in the belly,

an exceedingly quick and weak pulse, and cold sweats over the whole body. Glysters, which had been ordered for her, could not be forced up. After a long examination with candles, &c. some hardened feces were brought away from the rectum; but the low and faint state of the patient had now so greatly increased, that very little hope remained of her surviving even a few hours. On the next morning, to the great surprize of her attendants, she had considerably recovered; her pulse was about eighty, and moderately full; but as no stools had yet been procured, pills of the cathartic extract and calomel were given every two hours. She began to be purged in the evening, and had eight or ten stools before the next morning. Her strength again failed; the pulse could scarcely be felt, and the body was covered with a cold sweat. By the liberal use of strong broth, sago, and wine, she was so far restored in a few days as to sit up in bed. Her appetite returned, and well-grounded hopes of her recovery were entertained.

For some time after this she exhibited

alternately the opposite symptoms above mentioned, according to the state of the intestinal functions. She was seized, in about six weeks after the operation, with violent pain in the lower part of the abdomen; which terminated in two days in a discharge of the feces through the wound, and perfect ease. The appetite now failed, the strength decreased, and death took place on the eighth day from the appearance of the feces in the wound.

On examining the body, the whole of the intestines were found so strongly adherent to each other, that they could not be separated without laceration. A portion of the ilium, the same probably, which had been protruded, adhered to the abdominal ring.—It's coats were greatly thickened, and it's canal very much contracted. A small ulcerated aperture was discovered in this part; and led, in a fistulous form, through a substance nearly equal in size to the little finger, to the external wound.

CHAP. IX.

SYMPTOMS, ANATOMICAL DESCRIPTION, AND
TREATMENT OF FEMORAL HERNIA.

THE femoral hernia is formed by a protrusion of some of the abdominal contents under the inferior margin of the external oblique muscle: and the swelling is situated towards the inner part of the bend of the thigh. In consequence of the greater breadth of the female pelvis, women are particularly subject to this rupture; inso-much that Mr. HER never met with any kind of strangulated hernia in females but this.*

* *Practical Obs.* p. 154. It is also much more frequent in married women than in girls; ARNAUD states, that nineteen out of twenty married women, afflicted with hernia, have this species of the complaint; while in men, and in unmarried females not one in a hundred has it. p. 133.

The swelling is generally small, and sometimes remarkably so;* in the latter case it may easily be mistaken for an inguinal gland slightly enlarged. The circumstances, which attended the origin and progress of the tumour, together with its present state and symptoms, generally enable the surgeon to decide upon the nature of the complaint; although the sensible characters of the swelling should be insufficient to lead to this discrimination. The existence of symptoms, which usually attend a strangulated hernia, will remove any doubt that the surgeon might entertain on the subject; and, if these symptoms do not yield to the usual remedies, will authorize him in operating, although the examination of the tumour should not satisfy his mind that the swelling is a hernia. No great inconvenience can arise from cutting down upon an enlarged gland; while the patient's life would be endangered by putting off the operation in a case of rupture. These considerations would undoubtedly have justi-

* SABATIER mentions instances where it has caused no external swelling.—*Médecine Opératoire*, tom. I. p. 144.

fied Mr. ELSE in opening the tumour in the fatal case of crural hernia, which he has recorded in the fourth volume of the Medical Observations and Inquiries:— for the want of fecal evacuations clearly pointed out the nature of the affection.

I have seen a hospital surgeon, a man of considerable practice and eminence in his profession, mistake a femoral hernia for a glandular enlargement, although the attendant symptoms sufficiently indicated the nature of the complaint. So strongly did the tumour in all its sensible characters resemble a swoln gland, that the operation was not performed, although the marks of strangulation were present; and the patient's death afforded an opportunity of ascertaining that the complaint had been caused by a protrusion of the bowel. Similar fatal errors are recorded by Mr. COOPER.* The importance of this subject and the inevitably fatal consequences of a mistake, induce me to repeat, what I have already observed, that the existence of

* Pt. ii. p. 8. PETIT, *Tr. des Mal. Chir.* tom. II. p. 293, et seq. mentions instances of the same kind.

symptoms warrants a surgeon in operating where the characters of the tumour are doubtful. I will venture to add, that, if in compliance with this maxim, the surgeon should, under any unusual concurrence of circumstances, cut down on a merely glandular swelling, he will be acquitted in the opinion of every judicious practitioner; and his conduct will not be attended with any injurious consequence to the patient: if, on the contrary, he persists in preferring the testimony of his touch to the dictates of his reason and judgment, and refuses to operate, where the symptoms demand the use of the knife, he must be considered as responsible for the death of the patient.

A femoral rupture has often been mistaken for a bubonocoele; and the error is not an improbable one, in consequence of the swelling lying, as it frequently does, on Paupart's ligament. The surgeon may consider this mistake as an innocent one, since it does not involve the nature of the complaint, nor the general measures required for it's relief. He must change his opinion when he finds that the pressure in the at-

tempts at reduction ought to be exerted in a very different direction; and that the close connexion of various important parts with the crural hernia, would expose him to the risk of some dangerous or even fatal mistake in performing the operation, under such an erroneous idea as to the situation of the rupture. The relation which the neck of the tumour bears to Paupart's ligament, and to the angle of the pubes, will enable the practitioner to distinguish the two cases. If the swelling of a crural hernia be drawn downwards, it will be found that Paupart's ligament can be traced passing over the neck of the sac; while in bubonocoele it is found under that part. The angle of the pubes, which is behind and below the neck of the sac in an inguinal hernia, is on the same horizontal level, and rather within it in the crural species.*

The lower border of the aponeurosis of the external oblique muscle has a broad

* RICHTER has seen this mistake often committed, even by persons of experience—*Tr. des Hernies*, p. 243; and Mr. COOPER has witnessed similar blunders.

insertion into the pubes; this attachment, which begins at the angle, runs along the crista of the bone. It's position therefore (in the erect state of the body,) is nearly though not entirely horizontal; consequently it's two margins should be described by the epithets anterior and posterior; it being remembered at the same time that the former of these is rather higher than the latter. That part of it which is fixed to the angle* of the bone, has the appearance of a firm and somewhat round tendinous chord; it's insertion into the crista† of the pubes is effected by means of a thinner portion, which gives to the tendon a clearly defined sharp edge at it's posterior margin. The latter division of the tendon must of course be situated much morē deeply from the surface than the former.

If we describe a distinct part under the

* This part is often termed the *tuberosity* of the pubes; and sometimes the *spinous process*.

† The rough and slightly prominent line extending outwards and backwards from the angle of the pubes, and receiving the insertion of Paupart's ligament has been generally described under the epithet of *crista*; but Mr. COOPER calls it *linea ileopectinea*.

name of Paupart's ligament, we should state, that when it approaches to the bone, it becomes suddenly broader; that it is fixed by this broad portion along the whole length of the angle and crista of the pubes; that it has a rounded and strong anterior edge, a thin and sharp posterior margin, and that the former of these is nearer to the surface, while the latter is comparatively deeply seated. The breadth of this part varies in different subjects: it is generally from three quarters of an inch to an inch. Sometimes, as GIMBERNAT* has stated, it measures more than an inch. Dr. MONRO† has observed that it is broader in the male than in the female subject; and from this structure he explains in part the more rare occurrence of this rupture in the male. The great importance of this part to our present subject renders it necessary that the surgeon should have a clear notion of the insertion of the crural arch in the pubes; I have therefore had a draw-

* *Account of a new method of operating in femoral hernia,*
p. 34.

† *Observations on crural hernia,* p. 51.

ing made to represent the ligament alone, with it's two attachments, in order to shew this point distinctly; and as the different parts will be immediately recognized by the reader, letters of reference would be superfluous.

Mr. HEY, whose excellent Practical Observations have made a most valuable addition to the records of surgery; and have thrown great light on the particular complaint, which forms the subject of these pages, has described at some length the parts which we are now considering. The general circulation, which this book has most deservedly gained, renders it necessary for me, with all deference to the well-known abilities and experience of this gentleman, to take the liberty of pointing out what appear to me to be errors in his representation of the subject. He describes the part, which he supposes to form the strangulation in crural hernia, under the name of *femoral ligament*; giving to the rest of the crural arch the epithets of *Pau-part's*, the *abdominal*, or *Fallopian ligament*.

There can be no objection to this new

term, as descriptive of a particular portion of the crural arch: but when the femoral ligament is said to be connected by an aponeurosis to Paupart's ligament, and to be separated from it occasionally by so wide a space, as to allow the whole contents of a rupture to be contained in the interval,* the proper regard for anatomical accuracy requires that the errors of such a representation should be pointed out. An examination of the dead subject will convince any person that the abdominal and femoral ligaments of Mr. HEY are only portions of one and the same continuous expansion; which is in fact the inferior margin of the aponeurosis of the external oblique muscle, is commonly known by the name of Paupart's ligament, and has been termed by GIMBERNAT and some others, the *crural arch*.

Mr. HEY has represented, what he calls the *femoral ligament*, under several points of view, which, if not actually contradictory and inconsistent with each other, render his description unintelligible to any one

* *Practical Obs.* p. 157.

who is previously unacquainted with the subject; and indeed make it rather doubtful what part he means to designate by this epithet. Thus he states that it “resembles the inferior border of the aponeurosis of the external oblique muscle of the abdomen:”* again, that it is “another ligament, somewhat similar to that of Paupart, but smaller.†” These expressions, together with the representations of it’s lying deeper than Paupart’s ligament, of the possibility of feeling it’s sharp edge by thrusting the finger on the inside of the femoral vein from the abdomen, and the directions which are given to divide it by cutting in the deepest and most interior part of the stricture, would lead us to conclude that the author was describing the thin posterior border of the crural arch. But in another place we find him calling it “a part of the fascia of the thigh;”‡ and this description, with the representation in the annexed plate, would rather induce us to suspect that the semilunar edge of the

* *Practical Obs.* p. 154.

† *Ibid* p. 151.

‡ *Ibid* p. 153.

fascia lata, which will be noticed presently, is the part alluded to. It is probably in consequence of these circumstances, that I have heard the readers of the work complain, almost universally, that after studying the description, and referring to the subject, they could not find “ Mr. Hey’s ligament.” For this reason I have taken more particular notice, than I otherwise should have done, of those inconsistent points in the description, which have rendered it puzzling to the reader. After these few remarks on the subject, I have great pleasure in adding, that the leading points in the anatomy of femoral hernia; viz. the protrusion of the viscera on the inside of the iliac vein; their strangulation by a part of the crural arch, which is felt when the finger is thrust down towards the thigh in this direction; and the important practical fact, that the division of this part is the right way of relieving the stricture, are correctly stated in Mr. Hey’s valuable work.

The anterior edge of Paupart’s ligament represents a straight line drawn from the

ilium to the pubes: the posterior border has an arched form towards the latter bone, in consequence of the expanded portion, which is fixed to it's crista. Hence has arisen the appellation used by GIMBERNAT, of the *crural arch*.

The space left between the ligament and os innominatum is filled, on the outside, by the psoas magnus and iliacus internus muscles, as they descend into the thigh, the anterior crural nerve lying on their surface; on the inside, by the femoral artery and vein, the latter being nearest to the pubes. The large lymphatics of the lower extremity also go under Paupart's ligament, in company with the femoral vessels; and there is frequently one or more lymphatic glands under the arch.

The iliacus internus is covered by a thin fascia,* with which the expanded tendon of the psoas parvus is intimately united. This is implanted into the posterior edge of Paupart's ligament, as far as where the crural vessels pass under this part. It is

* This fascia is described by Mr. COOPER under the name of *fascia iliaca*.

then continued behind these, and over the surface of the bone to the thigh; and forms the posterior portion of a sheath, including the vessels. A small space is left between the iliac vein, the thin margin of the crural arch, and the pubes, which is sometimes occupied by a lymphatic gland, and sometimes only filled with a loose cellular substance.

The fascia lata is fixed to the front of the crural arch; which is rendered by this attachment rather convex towards the thigh, when the limb is extended on the pelvis. Hence arises the pain sometimes experienced in a crural rupture on straightening the thigh; and hence also the necessity of bending the limb, when we perform the taxis. The fascia is not inserted along the whole length of Paupart's ligament: its attachment ceases on the inner side of the femoral vessels, and it is then continued to the front of the pubes, so as to cover the origin of the pectineus muscle. It has therefore no connexion to the thin border of the crural arch; and is not attached to the ligament opposite the space left between the vein and that thin margin. Yet

the cellular membrane about this situation has a compact and condensed appearance, which might lead a person to suppose that the fascia lata is inserted into Paupart's ligament beyond the point, where I have stated that it's insertion ceases. There is indeed, along the whole of the bend of the thigh, a thin and irregular fascia,* or condensed cellular texture, covering the upper portion of the fascia lata, and the lower part of the external oblique muscle. We can often trace two or three different layers of this expansion intermixed with the lymphatic glands.

Where the attachment of the fascia lata to Paupart's ligament terminates, it forms a semi-lunar fold, under which the vena saphena major enters to pour it's blood into the femoral vein. The concavity of this crescent is turned towards the opposite limb; the superior horn is the last portion of the fascia fixed to the crural arch; and the inferior is lower down in the thigh. This part is represented in the first plate of Mr. COOPER's work on inguinal hernia, al-

* Mr. COOPER calls it the *superficial fascia*.

though it is not marked by any letter of reference. Mr. BURNS* of Glasgow has delineated it, and calls it the *falciform process* of the fascia lata. It's upper extremity is marked by the letter k in Mr. HEY's† plate, as forming his femoral ligament. It is particularly in consequence of it's connexion with this falciform process, that the crural arch is rendered tense by extending the thigh, and rotating it outwards; and that the taxis should only be attempted when the limb is bent and rolled inwards.

The contents of a femoral hernia are protruded on the inside of the iliac vein. The space through which they pass is named by GIMBERNAT‡ the *crural*, and by Mr. HEY§ the *femoral* ring. This indeed is the only situation in which they can descend, since the attachment of the iliac fascia prevents a protrusion under any other part of the crural arch. The situation in which this rupture protrudes is rightly stated by

* *Edinburgh Medical and Surgical Journal*, vol. II.

† Plate iv.

‡ Page 38.

§ Page 148.

POTT;* but it is erroneously represented in several works, which are usually considered as of the highest authority. PETIT† and SABATIER‡ are so grossly ignorant on this point, that they speak of the parts descending over the psoas magnus and iliacus internus. CALLISEN§ states that the iliac vessels may be found behind, or on either side of the tumour: and even RICHTER,|| who says that the parts commonly protrude in the situation above described, mentions that they sometimes come down before, and sometimes on the outside of the iliac vessels.

The tumour is situated in front of the pectineus, and is consequently exterior to the fascia lata. I think it right to be more explicit on this point as surgeons have generally supposed that the femoral rupture is covered by the fascia of the thigh; and they even go so far as to say, that, in performing

* *Works*, vol. II. p. 152.

† *Traité des Mal. Chirurg.* tom. II. p. 249.

‡ *Médecine Opératoire*, tom. I. p. 143.

§ *Systema Chir. hodiern. pars poster.* p. 495

|| *Traité des Hernies*, p. 242.

the operation we may cut boldly through the integuments on this very account. I suspected the truth of this representation, from having often looked in vain for the fascia in operations; and from observing that the tumour feels loose, and has a circumscribed edge, instead of being tense, and having that obscurely defined margin, which we should expect, if it were covered with the fascia. Dissection has shewn that my suspicion was well grounded. If the integuments and cellular substance are carefully removed from a femoral rupture, we shall find that it lies on that portion of the fascia which, covering the pectineus, is inserted into the front edge of the pubes; and that, as it comes over the margin of the bone, to which the fascia is fixed, it must necessarily be placed on the outer surface of that part.

The variety of crural hernia,* in which the parts are contained within the sheath of the crural vessels, must be excepted from these observations. The swelling in that

* COOPER, pt 2, p. 20. plate 8, fig. 1.

case is covered by the fascia lata; is consequently more obscure to the feel; and has not a defined edge.

The falciform process of the fascia lata passes along the upper and outer part of the tumour. The iliac vein is placed on the outer side of the neck of the sac; the pubes is directly behind it; and the upper and inner parts are bounded by the thin posterior edge of Paupart's ligament. It is this part which forms the strangulation, as any person may easily ascertain, by passing his finger into the neck of the sac, or by thrusting it, in the healthy subject, into the corresponding part. The merit of first discovering, and of making public this fact is due to GIMBERNAT.

The semi-lunar portion of the fascia being attached to the crural arch close to the point, at which the hernia comes out, contributes sometimes to the strangulation, as we may ascertain by passing the finger in the course of the rupture. Hence the stricture is relieved by relaxing this process. It's effect, however, in producing the incarceration, is slight in comparison with that

of the thin posterior border of Paupart's ligament.

In the second part of his observations on hernia, Mr. COOPER has entered very minutely into the description of the anatomy of the crural arch, both in it's natural and diseased state. According to this gentleman's representation, the viscera contained in a crural rupture are protruded in the first instance into the sheath surrounding the femoral vessels; from which they escape through the openings, formed for the passage of the lymphatics of the lower extremity. Hence it follows that the most frequent seat of strangulation is in the border of this opening. My own examinations of the subject have led me to refer the cause of stricture to the thin posterior border of the crural arch, and I have hitherto found no reason to change my opinion on that subject. The difference does not appear an important one; nor can it influence the mode of operating.

The epigastric artery passes obliquely upwards and inwards on the outside of the hernial sac; and is situated at the distance

of half an inch from the neck of that part. The obturator artery is frequently produced by the epigastric, in which case it may either go on the outer side of the sac to the obturator foramen, or it may pursue it's course along the inner margin. In the latter distribution the neck of the sac would be surrounded by a large vessel in three fourths of it's circumference. The iliac vein is on the outside; the common trunk of the epigastric and the obturator vessels would lie on the front, and the obturator artery itself would be found on the inner margin of the sac.

The spermatic chord and the round ligament of the uterus pass directly over the superior part of the swelling; and are not more than half an inch distant from the mouth of the sac.

The viscera descend from the abdomen nearly in a perpendicular direction, and then come forward to the surface, so as to lie in general in front of the crural arch. Instead of descending towards the thigh, they extend in the lateral direction, so that the long axis of the swelling is in the same

course with Paupart's ligament. Dr. Monro* probably means to describe this peculiar course of the hernia, when he speaks of the swelling being "tilted upwards" on the ligament. In consequence of this structure the *body* of the sac forms a right angle with the *neck*; and that part of it, which if it had continued to descend in a straight direction from the abdomen, would have been the lowest part of the bag, or the *fundus*, is actually the anterior portion. Our pressure in performing the taxis must be regulated by these circumstances.

That portion of the sac, which lying under Paupart's ligament, may be called it's neck, is generally about half an inch in length, and is frequently more. When we consider that the strangulation takes place exactly where this contracted portion communicates with the abdominal cavity, and that the parts are covered by a considerable thickness of adipous substance, we shall expect to find the strangulated part at a great distance from the surface.

* *Observations on Crural Hernia*, p. 84.

The peritoneal sac of the rupture is covered here, as in the bubonocoele, with an exterior investment, formed from the condensed cellular membrane, which is found about the opening at which it protrudes.

Mr. COOPER has furnished us with a more detailed account of the coverings of the hernial sac. He gives to that covering, which I have just described, the name of *fascia propria*; and the following is his account of it's origin: “ A thin fascia
“ naturally covers the opening, through
“ which the hernia passes, and descends
“ on the posterior part of the pubes. When
“ the hernia therefore enters the sheath, it
“ pushes this fascia before it, so that the
“ sac may be perfectly drawn from it's
“ inner side, and the fascia which covers it
“ left distinct. The fascia, which forms
“ the crural sheath, and in which are placed
“ the hole or holes for the absorbent vessels, is also protruded forwards, and is
“ united with the other, so that the two
“ become thus consolidated into one. If
“ a large hernia is examined, this fascia is
“ only found to proceed upwards, as far as

“ the edge of the orifice on the inner side
“ of the crural sheath, by which the her-
“ nia descends ; but in a small hernia it
“ passes into the abdomen as far as the
“ peritoneum, and forms a pouch, from
“ which the hernial sac may be withdrawn,
“ leaving this, forming a complete bag over
“ the hernia.”* The practitioner is only
required to remember that the peritoneal
sac of a crural hernia is covered by a very
complete exterior investment of a mem-
branous nature ; and that the division of
this outer covering has often led opera-
tors to suppose that they had laid bare the
intestine, while the true hernial sac remained
entire. Besides this fascia propria, Mr. COO-
PER also states that the superficial fascia of
the bend of the thigh gives another cover-
ing to the swelling.

The space through which the contents
of a femoral hernia descend, is very small,
and does not admit of much enlargement
in any direction. Hence the swelling is
generally small ; and hence also this rup-

* Pt. 2, p. 6 and 7.

ture, in it's incarcerated state, is distinguished beyond any other, by the closeness of the stricture. The opening is very seldom increased to any great magnitude, as that of the abdominal ring is in large and old scrotal herniæ. Exceptions to this observation, although very rare, do occasionally happen.

CASE.

A middle-aged woman was admitted into St. Bartholomew's Hospital with a femoral rupture of eight years standing. It had generally admitted of partial reduction, and once, during a state of pregnancy, had entirely receded. Although the size of the swelling had been always very considerable, it had never occasioned any inconvenience, except from it's bulk, until the time of her admission, when it measured nineteen inches across in the perpendicular direction, and twenty-seven inches in circumference. The integuments at this time had a red appearance, and the patient was

in a state of considerable general weakness; The strength gradually declined; the integuments ulcerated and burst, so as to expose the intestines partially; and about a gallon of serous fluid escaped from the opening. There was a constant discharge of the same fluid until the time of her death. Dissection shewed that the protrusion had taken place in the usual situation under the crural arch, and that the sac contained the whole of the jejunum, ilium, cæcum, and ascending colon, with a large share of the omentum.

Mr. HEY* mentions a similar instance to that which I have now related; and Mr. THOMSON,† the learned professor of military surgery in Edinburgh, has witnessed a case of the same description. In both the last-mentioned patients the integuments had become so thin in consequence of the increase of the tumour, that the peristaltic motion of the bowels could be distinguished.

* *Practical Observations*, p. 230.

† COOPER, pt. 2, p. 6.

In all the instances of strangulated femoral hernia, where I have seen the operation, there has never been room to pass more than the very tip of the operator's finger under the stricture; and frequently even this has been impracticable. I have constantly found the same state of parts in the dead subject, except in the remarkable case related above; and in one instance, where the sac actually contained both intestine and omentum, I could not, after removing the protruded parts, pass my fore-finger into the opening. These circumstances will lead us to expect, as we actually find to be the case, that the femoral hernia easily becomes strangulated; that the closeness of the stricture diminishes the chance of reduction by any means but the operation; and that the great pressure, which the parts experience, must render delay very dangerous.

I think it right to insist more particularly on these points, because Mr. POTT has represented them in a directly opposite light. He states that the femoral rupture seldom becomes strangulated; that the contents

may generally be returned in the operation, without any incision of the stricture, on account of the “large space between the os ilion and os pubis, and that that space is occupied principally by cellular membrane and fat.”* The anatomical incorrectness of this representation will be detected by the most inexperienced student. I am authorized in stating that the surgical inferences are equally false by having seen the operation performed in twelve instances, and having had several opportunities of examining this hernia in the dead subject. It may, however, seem presumptuous in me to contradict a writer, whose vast experience and sound judgment give such a weight to his opinions, on a point, which must be determined by an appeal to facts. For this reason I shall quote the words of Mr. HENRY, who has already noticed the incorrect representation given by the writer above-mentioned, that my own opinion may receive the support of his experience.—“These declarations surprize me exceedingly, coming from the pen of an

* *Works*, vol. II. p. 138.

“ author, who wrote so much from his
 “ own experience, as I conceive Mr. POTT
 “ to have done. If we look at the ske-
 “ leton, we shall undoubtedly see a con-
 “ siderable space between the os ilium and
 “ pubis; but if we take our ideas from
 “ a subject labouring under a strangulated
 “ femoral hernia, we shall rather wonder,
 “ from the smallness of the aperture, how
 “ a descent could have happened. I have
 “ now performed the operation for the
 “ femoral hernia fourteen times in the fe-
 “ male, and twice in the male subject, and
 “ have always found great difficulty in in-
 “ troducing the smallest portion of my
 “ fore-finger into the femoral ring, for the
 “ purpose of conducting the bubonocoele
 “ knife. Nay, this introduction I have
 “ twice found impracticable, and have
 “ been under the necessity of making
 “ use of a director. In no case, in which
 “ I have operated, did there appear the
 “ least probability of reducing the pro-
 “ lapsed parts, without previously enlarging
 “ the aperture.”*

* *Practical Obs.* p. 150.

I am happy to find that the opinion of Mr. COOPER, as expressed in the second part of his most valuable work on hernia, coincides so completely with my own experience on this very important point.—This gentleman notices the comparative smallness of the crural rupture; and states that he has found the means of reduction less frequently effectual in this, than in the inguinal hernia, which he ascribes to two causes, viz. the unyielding nature of the parts, through which the hernia descends, and the smallness of the aperture, forming the mouth of the sac.* He adds that “the delay of the operation, which he lamented and condemned when speaking of inguinal hernia, is to be still more deprecated in the crural; for death very generally happens earlier in the latter disease than in the former.” The relation of a case follows, in which death took place in twenty-one hours and a half from the accession of the symptoms. In two others, at the end of forty hours the parts were so much altered that it was not

* Pt. II. p. 15.

thought proper to return them into the abdomen. After mentioning some other instances of the fatal effects of delay, Mr. COOPER concludes by giving his opinion in the following terms: “ So strongly am I
 “ impressed with this belief, that if I were
 “ myself the subject of crural hernia, I
 “ should only try the effect of tobacco
 “ glysters, and if they did not succeed,
 “ would have the operation performed in
 “ twelve hours from the accession of the
 “ symptoms,”*

In our attempts to reduce a crural hernia by means of the hand, the pressure must be accommodated to the peculiar course in which the parts descend. The general observations, which have been already made, concerning the position of the patient, &c. will apply here. As Paupart’s ligament, and the fascia of the thigh are so immediately concerned with this swelling, the precautions of bending the hip, turning the limb inwards, and carrying the knee over the opposite thigh, are particularly necessary in order to relax these parts. The pressure

must first be exerted downwards and backwards, to push the swelling off the surface of Paupart's ligament; and if the parts recede under the application of the force in this direction, it must be continued upwards, in order to make them pass under the crural arch. It must be very obvious, from the description of the course in which the rupture descends, that no advantage whatever can be obtained by pushing the swelling upwards in the first instance.— Let the practitioner remember that the smallness of the mouth of the sac, and the consequent tightness of the stricture diminish the chance of effecting a replacement of the rupture by means of the taxis; and consequently, that when the incarceration is completely formed, he should not waste much time in attempts of this description.

The operation for the femoral hernia will be performed in the same manner as that for the bubonocoele. The division of the integuments, beginning an inch above the crural ring, should run obliquely downwards and outwards. I prefer an incision in this direction to one, which would cross

the middle of the tumour in compliance with the general practice; because it runs over that part of the ligament, which I propose to divide, in order to set at liberty the strangulated parts; and thus we gain more room for executing a part of the operation, which is rendered peculiarly difficult by the great depth at which the stricture is situated.

With the same object of gaining room Mr. COOPER* advises that two incisions should be made in the integuments, resembling the letter T reversed, and having their point of union in the middle of the tumour. The first of these passes perpendicularly over the upper half of the swelling, and is crossed at right angles by the second; which extends in a transverse direction. The angular flaps of the integuments, made by these incisions, are then to be dissected off on each side.

The structure and arrangement of the the coverings, which invest the peritoneal sac, must be borne in mind by the surgeon in executing the second part of his opera-

* Pt. II. p. 15.

tion, that of laying bare the hernial contents. I have many times seen considerable embarrassment arise from an ignorance of this structure, in consequence of which the division of the fascia has led the operator to suppose that he had penetrated the true sac, and exposed the intestine, while it was still covered by peritoneum. But the merely temporary confusion is not the worst consequence of such a mistake: it has been attended in one instance with a fatal termination. After cutting through the first and most superficial investment, the hernial sac with it's fascia propria unopened, was returned into the abdomen. As a free dissection was required, in order to separate it sufficiently for this purpose, the surrounding parts were left in such a manner, as, in conjunction with the neck of the sac, to continue the strangulation, and consequently to cause the patient's death.*

Particular caution is required in opening the sac, as this hernia never contains more than a very small quantity of fluid; and as the protruded part is very frequently a por-

*•COOPER, Pt. II. pl. vii. fig. 4.

tion of intestine unaccompanied by omentum.

The direction of the incision for the removal of the stricture is a very material point of consideration, from the important parts, which so closely surround the neck of the sac. If the knife be directed upwards and outwards, the epigastric artery is greatly endangered. If we cut straight upwards, the spermatic chord is exposed to risk. The latter source of danger does not, however, exist in female subjects, on whom the operation is performed in the great majority of instances. An incision of the most interior part of the stricture is free from all danger in the ordinary course of the vessels. But that variety, in which the obturator artery, arising from the epigastric, runs along the inner margin of the sac, seems to preclude us from cutting even in this direction. A mode of operating has been lately proposed with the view of avoiding this danger. We are directed to make an incision through the aponeurosis of the external oblique muscle, just above the crural arch, and in a direction parallel to that part: to introduce

a director under the stricture from this opening, and to divide the tendon to the requisite extent by means of a curved knife passed along the groove.*

If this plan were perfectly executed, it would undoubtedly remove all risk of injuring any of those parts, which are more or less endangered in the other ways of relieving the stricture. But it supposes a too perfect and familiar acquaintance with the anatomy of the parts, to admit of being practised by surgeons in general. The close connexion of the hernial sac to the tendon in an old rupture will constitute a considerable source of difficulty. If the arteries run so near the crural arch as to be endangered by the other way of operating, there must be great risk of wounding them in this method; particularly if the parts should be obscured by bleeding. Lastly, the contents of the swelling would be inevitably exposed to danger, as the extreme

* *Edinburgh Medical and Surgical Journal*, vol. II. p. 205. It seems that this mode of operating was first proposed by Mr. ELSE of St. Thomas's Hospital.—COOPER, pt. II. p. 17.

closeness of the stricture does not admit of interposing any thing to guard them.

I consider the best and safest method of executing this part of the operation, to be that of dividing the thin posterior border of the crural arch, in the part first recommended by GIMBERNAT; that is, as nearly as we can to it's insertion in the pubes. This is the very part which constitutes the stricture, and where a smaller division will accomplish our object, than in any other situation. Yet half an inch in all cases, and in many instances a longer space may be gained in this quarter, without affecting the main insertion of the ligament into the angle of the bone. The crural arch therefore is less weakened by a division of this, than of any other part.

Strong testimony in support of these points may be derived from the advice of RICHTER, who recommends an incision in the same portion of the arch, without knowing the anatomical reason, on which it's propriety is grounded. The following passage shews his opinion on this subject; “ Je conseille en même temps de faire

“ l’incision le plus près possible de l’angle
 “ interne de l’arcade, non seulement parce
 “ qu’on est plus éloigné de l’artère épigas-
 “ trique ; mais parceque la hernie passe
 “ principalement par cet endroit, et *qu’on*
 “ *obtient beaucoup plus d’espace lorsqu’on*
 “ *élargit cet angle.*”*

Mr. HEY has very candidly stated that he had, from experience, gained a knowledge of the proper manner of performing the operation, before he had acquired from anatomical investigations, a just idea of the part, which principally causes the strangulation. He adds, that he had often wondered that so small a division of *the most interior part of the stricture* should be sufficient for reduction.

It will generally be practicable to introduce the tip of the finger or of the nail under the edge of the tendon ; the fibres of which should be carefully divided in succession, with the probe-pointed knife, until we have gained just sufficient room to replace the contents of the swelling.

* *Tr. des Hernies*, p. 249. Or in his *Anfangsgründe der Wundarzneykunst*, vol. V. p. 449.

When the tightness of the stricture prevents the operator from using his finger as a guide, he will employ the grooved director, introducing it as near as he can to the pubes. In both cases the blunt end only of the curved knife should be passed beyond the stricture, that the division may be effected without risk to the arteries, in case they should not follow their usual course. The intestine should be protected by the operator's left fore-finger while he is using the right hand in cutting the tendon; and if both his hands are employed, it may be held aside by an assistant. For the depth at which the stricture is situated from the surface, and the narrowness of the opening occasion some danger of injury to this part.

This mode of operating will entirely avoid the spermatic chord, and the epigastric artery in the ordinary course of the vessel. It must be allowed, that in the less frequent distribution, which has been described above, the obturator artery will be endangered. The risk is not sufficient to induce us to exchange this for any other method, that has been hitherto proposed;

as I know of none, which avoids the vessel more certainly, while in facility of execution, and in other advantages, this has the undoubted preference.

A calculation of the proportionate number of instances, in which we may expect to find the obturator artery running along the inner side of the neck of the sac, will much diminish our apprehensions concerning the danger of this vessel. Dr. MONRO has found the obturator artery to arise from the trunk of the epigastric once in twenty-five or thirty subjects; I should think this unusual origin must occur as often as once in ten instances; yet, where the source of the vessel thus deviates from the accustomed description, it generally takes its course along the outside of the hernial sac, and consequently is exposed to no danger.* The comparative number of instances, in which it is found on the opposite side, cannot be

* “ In all cases (says Mr. COOPER) which I have myself
 “ dissected, where this variety existed with crural hernia,
 “ the obturator has passed into the pelvis on the outer side
 “ of the neck of the sac, entirely out of the reach of any
 “ danger of the knife.”—Pt. II. p. 21.

stated higher than one in eight or ten. It would therefore be endangered only once in eighty or one hundred operations. And, if we consider, that by the caution of introducing the knife to the very smallest distance within the stricture, that is compatible with effecting the cut, by the careful successive division of the tendinous fasciculi, and by carrying this division only just so far as to gain the necessary room for reduction, the artery may frequently escape; the probability of any unpleasant occurrence is so much diminished, that it hardly constitutes an objection, and certainly would not justify us in leaving this method for any but one that should be perfectly free from all danger.

All the evidence that I have been able to collect on this subject, concurs in demonstrating the safety of the above-mentioned mode of operating. My own practice has only furnished me with one opportunity of trying its merits; and that was perfectly successful.

CASE.

— JOINS, a poor woman of the parish of Ampney, near Cirencester, about fifty years of age, had laboured under a strangulated femoral hernia for six* days, in which time all the usual remedies had been unsuccessfully employed. On performing the operation, a piece of omentum and a small bit of intestine were found to have passed under Paupart's ligament. Both these parts were of a deep red, and almost brown colour. I removed the omentum; and the

* The reader may think that this case does not accord with the representations I have already given concerning the urgent nature of the symptoms, and the rapid progress of crural herniæ. The circumstances sufficiently account for this deviation from the usual course. It must be remembered that the intestine was protected from pressure by a mass of omentum; and the age of the patient also be taken into the account.

In an instance, recorded by Mr. Cooper, the operation was successfully performed on the eighth day; there also a large portion of omentum was protruded with the gut.—
Pt. II. p. 24.

divided edge did not afford the slightest hemorrhage. The stricture, which was very deeply seated, was manifestly formed by the thin posterior border of the crural arch. I divided it, in the situation which I have recommended above, by conveying the probe-pointed bistoury in the groove of a director. The parts were now returned with ease, and the patient soon recovered.

Four cases, in which I have seen the operation performed by others, were attended with the same fortunate result. GIMBERNAT has operated in this way in four* instances: and Mr. HEY† employed a nearly similar method with advantage in a much greater number of cases. Mr. COOPER's mode of operating, which must stand on exactly the same ground with that which I have recommended, as to the danger of wounding arteries, &c. has never been attended with any unpleasant consequence in the numerous instances in which he has practised it.

GIMBERNAT's operation has been objected

* P. 28 and 29.

† P. 150, et seq.

to by Mr. COOPER, who recommends a different method of removing the stricture. On account of the depth, at which the posterior margin of the crural arch is situated, and the closeness with which the protruded viscera are embraced by the tendon, he states that the intestine is greatly endangered: that it may easily get before the edge of the knife; or, if it be held aside sufficiently, it is exposed to the danger of laceration. He relates two cases, in which accidents of this kind have actually occurred, and caused a fatal termination. He is therefore in the habit of dividing the stricture on it's anterior part, as far as the front margin of the crural arch, directing the edge of the knife upwards and inwards. If this is not sufficient, he afterwards divides the thin posterior border of the tendon, still carrying the knife in the same course. In the male subject he makes a small transverse incision above Paupart's ligament, and draws the spermatic chord out of the reach of the knife by means of a bent probe.

The want of a sufficient number of opportunities of trying both operations prevents

me from forming a decisive opinion on the comparative merits of this proposal, and that which I have already recommended. The thin edge of the crural arch has always appeared to me to be so materially concerned in forming the stricture; and it is so clear, that a division of this part affords much more room than that of any other, that I consider GIMBERNAT's method as meriting the preference. A wound of the intestine can only be ascribed to the want of sufficient care on the part of the operator.

CHAP. X.

ON UMBILICAL HERNIA.

THE terms *exomphalos*, *omphalocele*, or *umbilical hernia* are applied to that species of rupture, in which the abdominal contents are protruded through the opening in the linea alba, which transmits the umbilical vessels of the fetus, or in the immediate vicinity of that part. Whether the protrusion take place most frequently in the former or in the latter of these two situations, is a question, the determination of which can be of no practical consequence, although it might perhaps influence the name of the complaint. The term *exomphalos* can certainly be applied with propriety to that rupture only which occurs at the umbilicus; while any displacement of the viscera through the linea alba in the

neighbourhood of the navel should be classed with ventral herniæ.

It was observed by PETIT,* that, in the adult, the parts are most frequently protruded at one side of the umbilicus: but Mr. COOPER† is of opinion that they usually take their course through that opening itself. It seems probable that there may be a difference in this respect according to the period of life at which the complaint occurs. The umbilicus, which is a kind of cicatrix, formed after the separation of the funis, by the contraction of the parts to which that chord was connected, arrives by a slow and gradual progress at the degree of firmness and solidity, which it possesses in the adult. Remaining for a long time weaker than the rest of the abdominal parietes, it offers but a feeble obstacle to the protrusion of the viscera: the resistance however increases with time; the navel becomes stronger than the surrounding parts, and prevents more effectually the escape of the bowels.

* *Traité des Mal. Chirurg.* tom. II. p. 250.

† *On Crural and Umbilical Hernia*, p. 35.

These anatomical facts will furnish us with two pathological inferences, the truth of which is supported by experience. First; that infancy is more subject than any other age to umbilical herniæ, properly so called, where the viscera are protruded through the navel itself. Secondly; that adults are more exposed to that species of the complaint, in which the hernia takes place in the vicinity of the umbilicus.

The navel consists in the adult of a round tendinous ring, formed about the middle of the linea alba. The umbilical vessels of the fetus penetrate this opening, and proceed afterwards over the surface of the peritoneum, which lies entire and unperforated behind the aperture. A dense and compact cellular substance occupies the vacancy in the linea alba of the adult; being closely adherent to the peritoneum, and to the remains of the umbilical vessels posteriorly, and most firmly attached in front to an inflected and cicatrized portion of the common integuments.

The opinions of different surgical writers concerning the sac of the umbilical hernia

are much at variance with each other.— Many foreign surgeons have denied the existence of a hernial sac in the exomphalos. The names of DIONIS,* GARENGEOT,† and J. L. PETIT,‡ may be cited in exemplification of this remark. They state, that, as the peritoncum has cicatrized at the navel, it must be burst by the protrusion of the viscera. SHARP|| has met with a sac in the exomphalos, but seems to think that it is often wanting. The subject has been rightly represented by that excellent surgeon Mr. PORT.§ “ Whatever,” says this celebrated writer, “ are the contents, they “ are originally contained in the sac formed “ by the protrusion of the peritoneum.” He then adds, that this sac is very visible in recent and small ruptures, but that it cannot always be distinguished towards the navel in old and large ones. RICHTER¶ is

* *Cours d'Operations, par DELAFAYE, p. 106.*

† *Mémoires de l'Acad. de Chirurg. tom. I. p. 702.*

‡ *Traité des Mal. Chir. tom. II.*

|| *Critical Inquiry, p. 50.*

§ *Works, vol. II. p. 165.*

¶ *Traité des Hernies, ch. 35.*

undetermined on the point in question. He thinks it difficult to explain why the protruded viscera should not have the usual covering in this species of rupture; and he quotes SCHMUCKER and SANDIFORT as having observed a sac in cases of exomphalos. Yet he gives up his own opinion to the weight of authority, and concludes that an umbilical rupture, occurring in the adult, is not covered by peritoneum.

The erroneous notion, that the viscera are not included in a hernial sac, in the case of exomphalos, has arisen from a mistaken supposition that the umbilical vessels perforate the peritoneum at the part where they enter the body of the fetus. This error could never have been entertained by a person acquainted with the true structure of the parts, since he must have known that the peritoneum is just as entire here as in any other situation of the abdominal parietes. It does indeed often happen, in consequence of that membrane being closely connected to the inflected cicatrix of the integuments, that the distinction between the skin and hernial sac cannot be traced

on the front of the tumour; but it is even then most easily discerned in every other part of the circumference. In other cases a hernial sac can be demonstrated over the whole exomphalos just as clearly as in any other species of rupture.

The umbilical hernia is not only furnished with a true peritoneal sac, but it possesses likewise a more superficial investment, derived from a condensation of the surrounding cellular substance.

A practical precept, derived from the supposed want of the hernial sac, of proceeding with great caution in exposing the contents of an umbilical rupture, which requires the operation, is just as necessary as if the anatomical observation, which suggested it, had been strictly correct. The hand of a prudent operator will be guided by this maxim in every species of rupture; but the present case certainly requires a more strict attention to such a precaution, since in many cases the integuments and hernial sac cannot be distinguished on the front of the tumour. It may indeed be noticed, as a general observation, that the

coverings of an umbilical rupture are frequently very thin. The pressure of the contents in a large and old exomphalos produces sometimes a more or less complete absorption of the sac, which will account for several phenomena, that have been observed in these cases, and may likewise excuse the incorrect opinion as to the want of a hernial sac. The contained viscera have been found in many instances adhering to the integuments.* Mr. COOPER† has seen portions of the omentum contained in an exomphalos passing through openings in the sac, which must have been produced by absorption; and has even known intestine to be strangulated in a similar aperture.‡

Besides the causes, which we have stated in the general description of herniæ, there are some of a local nature, which will act particularly in contributing to the formation of umbilical ruptures. The distention of

* ARNAUD on *Hernias*, p. 323.—MONRO *Obs. on Crural Hernia*, p. 24.—COOPER on *Crural and Umb. Hernia*, p. 37.

† Loco citato, p. 36.

‡ L. c. p. 46.

the navel by the water accumulated in ascites has led to the subsequent occurrence of an exomphalos. The enlargement of the abdomen in pregnancy often produces this rupture, by weakening the navel or immediately surrounding fibres of the linea alba; and excessive corpulency acts in the same way in both sexes.

The contents of an exomphalos are the omentum, with or without a portion of intestine. It has happened very rarely, if ever, that an umbilical rupture in the adult has contained intestine unaccompanied by omentum. The transverse arch of the colon, is the gut most frequently protruded in this hernia, as we might indeed have inferred a priori from considering the natural situation of the part in the abdominal cavity; but the presence of the small intestine is by no means an unfrequent occurrence.

A patient labouring under exomphalos is still more subject, than in other cases of hernia, to colic, flatulence, vomiting, and the various species of intestinal derangement. Hence particular attention is required to the quantity and quality of the

food, and to the preservation of the digestive organs in a healthy state.

From the description, which I have given of the umbilicus, it will immediately appear that the contents of this rupture can become strangulated only by the margin of the tendinous opening in the linea alba; it is susceptible of no other species of incarceration besides that.*

I shall divide the observations, which I have to make on the treatment of umbilical hernia, into three parts, according to the natural and essential distinctions in the complaint. These divisions will be; first, congenital exomphalos; secondly, that which occurs in young subjects; and thirdly, that of the adult.

* The case which I quoted above from Mr. COOPER, of strangulation by an opening in the sac, being a single instance, will hardly justify us in forming an exception to this general assertion.

SECT. I.

Congenital Umbilical Hernia.

THE first species of the complaint may be termed *Congenital*, with the greatest propriety, as it exists at the time of birth. The umbilical chord terminates in a bag, containing more or less of the abdominal contents, and communicating with the cavity of the belly by an opening in the usual situation of the navel. The tumour is not covered by integuments, but appears as if formed by a dilatation of the chord. Its coverings are so thin, that the contents can be readily perceived externally. Dr. HAMILTON* of Edinburgh informs us, that for the last seventeen years, he has usually seen about two instances of this kind annually.

This form of the complaint ought not, strictly speaking, to be called a rupture, as it happens, no doubt, from an original de-

* COOPER, pt. II. p. 57.

ficiency in the formation of the part. Indeed, from the situation of the fetus in utero, and the absence of respiration, it would be absurd to suppose, that a rupture could take place before birth.

When these swellings are of a moderate size, we have the power of curing them, either by the use of bandages, or the employment of the ligature.

Mr. HEY* relates a case, in which he employed the former of these methods with success. The swelling was of the size of a hen's egg. After reducing the intestine, he brought together the sides of the opening, and covered the part with plaister spread on leather, applying other pieces over the first in a conical form. A thick circular quilted compress was then placed on the part, and maintained there by a linen belt. The funis separated about a week after birth; and at the expiration of a fortnight from that time, the aperture at the navel was so far contracted, that the crying of the child, when the bandage was removed, did not cause the least protrusion.

* *Practical Observations*, page 226.

Dr. HAMILTON* has related, in a letter to Mr. COOPER, a successful instance of a different mode of treatment in a very similar case. After reducing the contents of the swelling, and applying a tight ligature round its base, the Doctor states that he brought together the edges of the parietes abdominis by means of two silver pins and adhesive straps, and that in a few days the cure was complete.

I should, for my own part, feel disposed to recommend Mr. HEY's treatment in preference to that of Dr. HAMILTON; as it seems to have been equally successful, and must be considered as much safer.

When, as it very frequently happens, the tumour is of a more considerable size,† its cure is more doubtful, although it would certainly be the surgeon's duty to make the attempt. Mr. HEY‡ returned the parts in a case where the whole intestinal canal seemed to be contained in the swelling; but the patient only lived two

* COOPER, part II. page 56.

† HALLERI *opera minora*, vol. III. p. 315.

‡ *Practical Observations*, p. 229.

days. In another case, where it appears that the tumour burst during parturition, he carefully replaced the viscera, but the termination was fatal.*

The preternatural deficiency in the abdominal muscles, causing that species of exomphalos, which we have just described, occurs in very different degrees in different instances; and these variations influencing most materially the chance of a cure, must regulate our prognosis in any particular case. The first and most favourable description of this affection is exemplified in the two cases first mentioned†: and in this we are fully warranted in expecting a successful termination under the modes of treatment already explained. In the second kind, where either the whole, or the largest part of the intestinal canal has quitted it's natural situation, we have little reason to expect that our curative efforts will be productive of success; yet we should not be discouraged from using every means in our power which the case admits of.—There is a third and yet more extensive

* *Practical Observations*, p. 228.

† See p. 268 and 269.

degree of this unusual formation, in which the very nature of the case seems to preclude all hope of assistance from the art of surgery. The dissection of such cases has shewn the liver, stomach, spleen, omentum, large and small intestines lying in the umbilical tumour.* The instances in which the whole anterior and lateral parts of the abdominal parietes are deficient, so that the viscera lie exposed on the surface of the body, seem to be only more complete specimens of the same kind, and should therefore be classed under a common head, with the abovementioned cases. SOE-MERRING† has given us a delineation of this kind of unnatural formation. I had an opportunity of examining a specimen exactly similar through the kindness of Mr.

* Two cases of this sort are described by MERY; see "Description de deux exomphales monstrueuses" in the *Memoires de l'Academie Royale des Sciences*, année 1716, p. 136. HALLER has witnessed the same kind of deformity (*Opera Minora*, tom. III. p. 316); and another instance is represented by SOE-MERRING (*Abbildung und Beschreibung einiger Missgeburten*, &c. folio, Mainz, 1791 tab. X. fig. 3.)

† Loc. citat tab. VIII.

HAINES of Hampstead; and I have seen another instance in a calf.

SECT. II.

Umbilical Hernia in young Subjects.

UMBILICAL hernia takes place in children before the navel has completely cicatrised, and consequently before the parts have acquired their perfect degree of solidity. The efforts of the child in crying are sufficient to produce it; and it's occurrence will be particularly favoured by the removal of the umbilical bandage, which should therefore be continued as a means of prevention for some weeks after the separation of the chord, particularly where, by feeling an impulse at the navel in crying, the occurrence of a rupture appears probable.

Although we should have expected these herniæ to occur very soon after birth, it appears from the numerous observations of DESAULT, that they take place most frequently at the second, third, and fourth

months: he states indeed that the complaint appears at this period in nine cases out of ten. It is at this time that the umbilicus begins to contract in the formation of that cicatrix, which opposes the protrusion of the viscera in the adult. The abdominal contents, protruded against the opening by the repeated cries of the child, distend and dilate it, and, carrying before them a portion of the peritoneum, form a small tumour, which gradually increases in size, and possesses the usual characters of a rupture.

The presence of the protruded parts maintains the umbilicus in an open state, and opposes the natural tendency of its margins to contract. This disposition however sometimes exceeds the resistance of the hernial contents, and forcing them back into the cavity, obliterates the opening through which they had proceeded, consolidates the parts, and thus produces a spontaneous cure. DESAULT has furnished us with two examples of this kind.* A

* *Œuvres Chirurgicales de DESAULT par BICHAT*, tom. II. p. 318.

child of two years old was brought for his opinion concerning an umbilical tumour, produced some months after birth, in consequence of the hooping-cough. The swelling, which equalled in size a large nut, yielded to the pressure of the finger, but returned on the least exertion of the abdominal muscles. DESAULT proposed the ligature, but could not obtain the consent of the relations; when this patient was seen for another complaint the following year, the tumour had completely disappeared. The parents stated that no external application had been used, but that the swelling went away spontaneously.

In another patient, aged five years, an umbilical rupture had subsisted from the time of birth. The application of the ligature, which had been recommended by DESAULT, was delayed in consequence of the appearance of the small-pox. When the child had completely recovered, it was found that the tumour had diminished in size, and that the opening, through which the viscera had protruded, had become considerably contracted. Struck by this phe-

nomenon, DESAULT conceived that nature alone might accomplish a cure, and did not interfere with the progress of the case. In the course of a few months the swelling had entirely disappeared.

These spontaneous cures are however by no means frequent. When the progress of a case is left to nature, the cure in the course of time becomes nearly impossible. The disposition, which the umbilical ring has, to close, is gradually lost; so that the aperture would not become obliterated at this period, even if the protruded viscera were kept in the reduced state. Hence we perceive that there is a very essential difference in the nature of the umbilical rupture, as it occurs in the infant or the adult; and that this distinction is derived from the tendency to contraction in the tendinous ring. In the former case a radical cure is easily obtained; in the latter it is nearly impossible. In the one instance it is sufficient to keep the viscera within the abdomen, and the ring will contract of itself. In the other the opening remains,

whether it be occupied by protruded viscera or not. Hence also it follows, that practical observations, drawn from one form of the complaint, cannot be applied to the other.

In treating that species of exomphalos, which we are now considering, our object is to obtain a radical cure. By returning the protruded parts, and keeping them reduced, the umbilical ring will contract, and become obliterated, so as to prevent any future protrusion. There are two methods by which this may be attempted, viz. compression, by means of bandages; and the ligature. The latter has in its favour the sanction of antiquity, but was almost superseded by the general adoption of the former method, when the celebrated DESAULT again brought it into use, and recommended it very warmly on the authority of his extensive experience. I shall present the reader with the result of the practice of the French surgeon, in his own words; and hope that the length of the extract will be excused from the celebrity of the author, and the importance of the subject; particularly when it is considered, that the

work* from which it is taken has not been translated into the English language.

“ The ligature and compression are both employed with the same object; that of preventing the viscera from remaining within the umbilical ring, and thereby favouring the approximation of the sides of the opening. In the first of these methods, the hernial sac, and the integuments which cover it are removed; and the cicatrix formed after their destruction, opposes the displacement of the bowels, while the margins of the opening, obeying the natural impulse which leads them to contract, and irritated by the operation which they have undergone, approach to each other, and unite, so as to obliterate the ring. In the treatment by compression, the place of the deficient portion of the parietes abdominis is supplied by a foreign body applied externally, which keeps the intestines within the abdominal cavity, so that they cannot offer any obstacle to the contraction of the umbilical ring. The

* *Œuvres Chirurgicales de DESAULT, par BICHAT.*—See the “ *Memoire sur la Hernie Ombilicale des Enfants,*” tom. II. sect. IV.

two processes are founded therefore on different principles, and reason and experience prove that their results differ accordingly.

“ It must be allowed, that compression is attended with no pain, but it produces inconvenience and restraint during the whole long space of time for which it must be continued. The ligature causes a momentary pain, but is attended with no subsequent restraint; it produces in a few days what compression only effects, when it succeeds, in several months.

“ In the one case, a constant and long-continued attention is required; if the treatment be suspended for the shortest interval, a great risk is incurred of losing the benefit previously gained: in the other, on the contrary, the object is attained to a certainty in spite of the cries of the child, and independently of the attention of it's nurses. The margins of the opening being compressed in the former method, the natural action of the parts must be impeded; while in the latter, by superadding an artificial irritation, to the tendency which the parts naturally have

to contract, the obliteration of the opening is hastened and assisted.

“ When compression is employed, it is produced by means of a flat body, or of a round or oval substance adapted to the form of the opening. In the former case, if the bandage is applied with precision, the skin and sac, forming a fold, are pushed into the opening, and impede it's obliteration by producing the same effect from without inwards, which the protruded viscera did from within outwards. The other method is exposed still more strongly to the same objection. By the ligature, the hernial sac and integuments are removed, and there is no obstacle to the obliteration of the opening. If the means of compression be not applied accurately, and kept uniformly in their proper situation, a portion of omentum, or bowel, may escape, and frustrate the object of our attempts. Supposing the compression to succeed, both methods accomplish the closure of the navel: but under the employment of the ligature there is superadded to the contraction of the aperture, an agglutination of its sides pro-

duced by the operation, and conferring a degree of solidity on the union, which can be obtained by no other process.

“ Experience confirms the theoretical statement which we have just given of the comparative merits of the two methods of treatment. On one side, we shall find the successes of compression occur amongst its failures; and we shall see the infants, on whom it is employed, suffering for years the trouble and inconvenience inseparably attending on it. The ligature, on the other hand, as employed at the Hotel Dieu, presents an uninterrupted series of well attested cures, which have amounted in the practice of DESAULT to more than fifty. In the latter years of his life, parents often brought their children to the public consultation, where the operation was performed immediately, and without any preparation. The patients were afterwards brought daily to the hospital, to be seen and dressed until the cure was completed.”

“ To these considerations must be added others, which will have some weight in influencing our determination. A poor per-

son insures the cure of his child, by passing a few days in a hospital, under the employment of the ligature: while, if compression be used, he is exposed to the frequent repetition of expense for the purchase of bandages, and to loss of time in paying the attention which this mode of treatment indispensably requires.

“ The antients employed the ligature in various ways; but the proceedings, which they have transmitted to us, may be referred to two heads. One consisted simply in returning the viscera, and placing a ligature on the integuments and sac: in the other, the swelling was opened either before or after the application of the ligature, to ascertain that the parts were all completely returned. CELSUS adopted the first of these methods: PAUL of Egina chose the second, and was followed by all the Arabian physicians, and by those more modern practitioners, whose knowledge was derived from Arabian authors. The works of AVICENNA, ALBUCASIS, and GUY DE CHAULIAC prove this assertion.

“ We shall not be long at a loss in

determining which of these methods deserves our preference. One is less painful, and equally certain; for surely a person can have no difficulty in deciding, by pressing the sides of the sac against each other, whether or no the protruded parts are completely returned. The other, with an useless cruelty, adds to the pain, without increasing the certainty of the operation.—This last has been generally adopted; and PARE who describes it, does not even mention the other method. Other variations again took place in the manner of operating. Some simply tied the base of the tumour, while others transfixed it with one or two needles in order to make the ligature more secure; and sometimes even made circular incisions with the same object. It is particularly in the Arabian writings that we meet with this process, which is not only cruel but superfluous; as the ligature, when properly applied, never fails. It is also described by PARE; but SAVIARD, the only modern practitioner who has treated the exomphalos by means of ligature, followed the method recom-

mended by CELSUS. SABATIER, in his learned work on the operations, speaks of both operations without deciding which merits the preference. The operation of DESAULT, nearly resembling that of SAVIARD, is simple, and attended with very little pain; it is performed in the following manner:

“ The child, on which it is to be performed, should be laid on it's back, with the thighs a little bent, and the head brought forward on the chest. The surgeon, having returned the protruded viscera, presses on the opening with one hand, while with the other he raises the sides of the sac, and slides them between his fingers to ascertain that no part remains unreduced. When he has assured himself that the parts, which he holds, consist of nothing but the integuments and hernial sac, his assistant passes a waxed ligature of moderate size several times round their basis, securing it at each turn with a double knot, drawn with such a degree of tightness, as to cause an inconsiderable degree of pain. The tumour, being

thus tied, should be covered with lint; over which there should be applied one or two compresses fastened on by a circular bandage, which should be secured by means of a scapulary.

“ On the succeeding day a slight swelling of the tumour is perceived, analogous to that which occurs in a polypus after tying it's basis, and attended with no pain. On the second day the parts shrink, and the ligature becomes loose: it's place should be supplied by another drawn rather more tightly. The application of this second ligature is generally rather more painful from the increased sensibility of the parts, consequent on the first operation. The swelling now soon loses it's colour, and becomes livid and flaccid; and a third ligature entirely intercepts the circulation. The part usually falls off about the eighth or tenth day, and leaves a small ulcer, which soon closes under the application of dry lint. The umbilicus has acquired by this time such a firmness that it does not yield at all to the impulse occasioned by coughing or any other exertion of the ab-

dominal muscles. It is however advisable, as a matter of precaution, to continue the use of a circular bandage for the two or three months immediately following the cure, lest the salutary operations of nature, employed at this time in the gradual obliteration of the umbilical opening, should be retarded by the pressure of the viscera against the parts.

“ We could recount a multitude of cases, in which the practice above detailed is confirmed by experience. But several have already been published in the *Surgical Journal*,* and an addition to their number would only lengthen these remarks unnecessarily. It is sufficient to state, that since the publication just alluded to, DESAULT has performed the operation in a vast number of instances with uniform success. Children were brought to him every week at the public theatre where he lectured, and had the ligature applied in the presence of the students; they were then taken home, and brought back daily to be dressed until the cure was complete.

* There is an account of nine cases treated in this manner in the *Parisian Chirurgical Journal*, tom. II. p. 189—199.

“ It may still be doubted, says SABATIER, in quoting an article from the Parisian Journal, where DESAULT speaks on this subject, whether the children have been radically cured: the hernia may have returned at some future period. A multitude of facts may be adduced to dispel this suspicion: several patients were brought to the public consultation of DESAULT for other complaints, long after the period of the operation, and were found on examination to have the umbilical opening completely obliterated, and to be free from the slightest impulse of the viscera against the aperture, in consequence of coughing, sneezing, &c. Most of the surgeons of the Hotel Dieu are acquainted with patients radically cured by the operation of DESAULT; and I myself know two young persons operated on four years ago, and now entirely free from the complaint.

“ The event of this operation, which succeeds almost invariably in infants of an early age, becomes less certain in proportion as they grow older. This observation will be confirmed by the following cases.

“ A child of eighteen months was brought to the clinical lecture of DESAULT,

to undergo the operation for umbilical hernia, which was performed by means of the ligature, in the usual manner. The tumour fell off on the seventh day; and on the seventeenth the ulcer had cicatrised. At the expiration of six months this patient was brought again to the hospital, and was found by the pupils to have no trace remaining of it's former complaint.

“ A boy four years old was operated on in the same way. The separation took place on the eighth day; and on the twentieth the parts had completely healed. An impulse of the viscera against the opening, which had not become entirely closed, could be perceived two months afterwards, in spite of the precaution of wearing a bandage, which had been observed constantly since the operation. At the end of the sixth month, however, this symptom had entirely disappeared.

“ A girl of nine years old was brought from the country for an umbilical rupture, which had subsisted since the time of birth. DESAULT, whose opinion was asked on this case, advised the operation, which he had

never hitherto practised at so advanced an age. It was performed with success, and the wound healed speedily: but two months afterwards the swelling began again to appear. A bandage was applied, but in spite of this the swelling in six months had become as it was originally.

“ The latter fact appears to contradict the experience of CELSUS, who operated as late as the fourteenth year. It illustrates however the principle formerly laid down, that the disposition, which the umbilical aperture has to become closed, is lost after a certain period. In the three preceding cases the event seems to have been completely influenced by the age of the subjects. A perfect cure took place at eighteen months; it was obtained with difficulty at four years; and a complete failure took place at nine. In several other instances, where operations have been performed at so late a period, the result has been the same.”

When an exomphalos in a young subject is treated by means of compression, we may expect a radical cure as in the use of the li-

gature; whereas, in a more advanced age the employment of trusses serves merely to keep the parts reduced. Circumstances do not admit the use of an elastic bandage at this age. The surgeon should take a convex solid body adapted to the size of the opening. RICHTER particularly recommends half a nutmeg wrapped in a piece of linen, for this purpose; and Mr. COOPER a portion of ivory; a piece of cork may also be used for the same purpose. When the viscera are carefully returned, let this body be placed over the opening, and be covered with a circular portion of sticking plaster. It may then be secured in it's place by a belt surrounding the body. As the child's motions are apt to occasion a change in the position of this belt, it should be made broader in front, that it may set more uniformly; and it may be either quilted, or be strengthened by a piece of leather at this part, to prevent it from becoming wrinkled.

In proportion as the child is younger, so much the more speedily and certainly do these means produce a radical cure. The chance of success is diminished according to

the age of the child, and the duration of the complaint. If the treatment be not adopted at an early age, the complaint will probably continue through life.

When we are endeavouring to obtain a radical cure by means of compression, it is important, that the parts should be kept constantly reduced; for if they are suffered to protrude at any time, the progress of the cure must be retarded. Hence, when a change of the bandage is required, we should carefully prevent any protrusion by placing a finger on the part, and keeping it there until the clean bandage is fastened.

SECT. III.

Umbilical Hernia in the Adult.

AN umbilical hernia occurring in the adult must be treated on the same principles as an inguinal or crural rupture. When it is small in size and reducible, it may be kept up by means of a truss made

like that for bubonocoele. The pad and neck of the truss should be continued in a straight line with the rest of the spring; and the latter part ought to extend beyond the spine.

When the size of the tumour is larger, the best truss hitherto devised is one represented in the work of Mr. HEX; for which we are indebted to the ingenuity of W. MARRISON, instrument maker at Leeds. An oval ring of steel is made to fit the front of the belly; from one side of this a spring extends towards the centre of the oval, and has connected to it's extremity the pad, which is meant to press on the opening. By means of this a strong and constant force is applied, which keeps the viscera constantly reduced. In the instrument, as described by Mr. HEX, a spring extends from either end of the oval ring towards the back, where the two nearly meet together. This part of the truss has been sometimes found inconvenient; and the end has been answered equally well, when it's place was supplied by a broad leather belt fastened to one end of the oval ring, and

buckled to the other, after passing round the body.

An irreducible exomphalos of moderate size may sometimes be conveniently supported, and prevented from enlarging, by means of a truss with a hollow pad. If however it's magnitude be considerable, other means of supporting the tumour must be resorted to; such as suspending it over the shoulders by bandages passed under the swelling.

The treatment of a strangulated umbilical rupture must be conducted on the principles laid down in the general observations on this subject; and if we fail in our attempts, the operation must be resorted to. This does not succeed so frequently as in the inguinal or crural herniæ; and Mr. POTT ascribes the greater frequency of failures to the circumstance of the symptoms arising more generally from disorder of the intestinal canal, than from strangulation. Hence he thinks that the necessity of operating is not so urgent in this, as in the other kinds of rupture. The cases which have fallen under my own observation lead me to

concur entirely with that celebrated writer in his opinion concerning the great fatality of the operation for strangulated exomphalos.

The surgeon will remember in performing this operation that the coverings of the hernia are often very thin, and that the integuments and sac are generally inseparably consolidated on the front of the swelling. His incision may extend longitudinally over the whole tumour, beginning half an inch or an inch above the opening in the linea alba; or it may resemble, in conformity with the advice of Mr. COOPER, the letter T inverted; the longitudinal portion of the cut terminating on the middle of the swelling, and a transverse incision crossing the tumour at right angles with the former, so as to join it's lower end. The stricture may be removed by cutting upwards: there is indeed no danger in giving the incision any other direction.

As the risk, with which this operation is necessarily attended, makes it advisable to diminish the subsequent inflammation and irritation, as far as lies in our power, I

should be strongly inclined to employ in a case of exomphalos, if the tumour at all exceeded a moderate size, that particular mode of operating which I described as applicable to large inguinal herniæ: in which the tendon is divided without opening the sac; or the latter part is only cut sufficiently to allow the division of the stricture.* This will permit the return of the parts if they are not adherent; and if adhesions should have formed, the immediate cause of danger, the strangulation, is removed. The practicability of this mode of operating in umbilical ruptures is fully proved by two cases recorded in the work of Mr. COOPER;† and the successful termination of both instances proved the judgment and sagacity which had suggested that peculiar treatment.

* There can, I think, be no doubt, that in the unfortunate case of exomphalos, related in the chapter on the treatment of the omentum, the patient would have had a much better chance of surviving, had the operation been performed in this manner.

† Part II. p. 51 and 55.

CHAP. XI.

ON CONGENITAL* HERNIA.

THIS case differs from the common scrotal rupture merely in the circumstance of the protruded parts being contained in the tunica vaginalis testis, and consequently lying in contact with the testicle itself, covered only by it's tunica albuginea. The hernial sac is formed therefore by the vaginal coat of the testicle.

The differences between a congenital and

* The term *hernia congenita* was applied to this affection by HALLER (*de herniis congenitis*, Götting. 1749, 4to. *Opuscula patholog.* Lausan. 1755, 8vo.) ; and the name is sufficiently justifiable, if we consider that the state of parts favouring its occurrence exists at birth, although the rupture itself may not be formed till a subsequent period. From this Latin term the English epithet *congenital* has been derived. I cannot understand for what reason Mr. POTT and some others have exchanged this for the appellation *congenial* ; which, according to it's common use and acceptation, must be perfectly absurd as applied to this or any other kind of rupture.

an ordinary scrotal rupture are, it must be confessed, less important in practice than in pathology; for the symptoms and treatment are very nearly the same in both species.

The fact, of the viscera being occasionally found in contact with the testicle, was observed by surgeons, long before the circumstances, leading to this peculiar modification of the complaint, had been investigated and explained. As the sac of the scrotal hernia lies in close contact with the tunica vaginalis, the older practitioners supposed that the pressure of the protruded parts might cause a preternatural communication between the two cavities; and thus they attempted to account for the phenomenon in question. The true nature of the complaint was ascertained about the middle of the last century; when the labours of several celebrated surgeons and physiologists threw much light on the whole subject.*

* See HALLER *opera minora*, tom. III.—POTT's *Account of a particular kind of Rupture, frequently attendant on new-born Children*, &c. London, 1765.—CAMPER in the *Harlemische Abhandlungen*, vol. VI. and VII.—HUNTER's *Medical Commentaries*, Lond. 1762 and 1764.—NEUBAUER

It is now well understood that the testis is situated originally in the neighbourhood of the kidney, where it receives a covering from the peritoneum in the same way as the other abdominal viscera derive their external investment; that in the latter months of uterogestation, it passes through the abdominal ring into the scrotum, carrying with it a portion of peritoneum; that the communication between the membranous bag, holding this gland, and the abdominal cavity is destroyed before the time of birth; and that the peritoneal coat which surrounded the testis in the abdomen, becomes the tunica albuginea, while the more loose process, that passes with it into the scrotum, forms the tunica vaginalis testis.*

Dissert. de tunicis vaginalibus testis et funiculi spermatici, Giessen, 1767.—LOBSTEIN *de Herniâ Congenitâ*, Argentorat, 1771.—PÄLLETTA *nova gubernaculi testis Hunteriani et tunicæ vaginalis descriptio anatomica*, Mediolani. 1777.—WRISBERG *Observat. Anat. de testiculorum ex abdomine in scrotum descensu*; in the *Commentationes reg. soc. scient.*, Götting. 1778.

* The numerous descriptions of the descent of the testis, which are already before the public, render it quite unnecessary for me to enter on that subject on the present occasion. I shall merely present the reader with the observations of

When, as it sometimes happens, the communication between the tunica vaginalis and the abdomen remains open after birth,* the occurrence of a hernia is very probable,

WRISBERG concerning the period at which this body changes it's situation, and the varieties which occur in the process.

Before the beginning of the sixth month the testis is always found in it's original situation near the kidney ; this circumstance therefore affords a very sure criterion respecting the age of a fetus. In the interval between the beginning of the sixth, and the end of the seventh month, it may be seen above the ring, or in it's passage through the opening, or just below it. When it has passed the tendon of the external oblique, it may still at first be pushed back into the abdomen, as the opening of communication is not yet closed.

Of one hundred and three children, which WRISBERG carefully examined for this purpose, at the time of birth, seventy-three had both testicles in the scrotum ; in twenty-one, one or both were in the groin ; in twelve, one or both were in the abdomen.

In nine of the last division the descent took place within the five first days after birth ; in one it happened on the twenty-first day ; and in the remaining two the testis had not appeared at the fourth or fifth week, when the infants left the hospital.—*Commentat. reg. soc. Scient.* Gotting. 1778.

* It should appear, by the observations of CAMPER, that the canal of communication is generally open at the time of birth. He dissected seventeen newly born children for the purpose of ascertaining this point. He found the canal open on both sides in eleven of these : it was obliterated entirely on one side, and only in part on the opposite in five ; and in

as there is a sac ready formed to receive any protrusion of the viscera; and the complaint assumes, under these circumstances, the peculiarities which constitute a congenital rupture. It is still necessary, that the causes, which give rise to herniæ, should act in this case as well as in any other; since the mere existence of the communication is not sufficient for the production of a congenital rupture. In quadrupeds the tunica vaginalis communicates with the abdomen, and yet protrusions of the viscera are very rare. In like manner the canal sometimes remains open in the human subject, to even the adult age, without the occurrence of rupture. The term *congenital* therefore is not applicable to this hernia in it's strict sense; as it does not usually exist at the time of birth; it generally appears soon after this period, but it may be delayed, even for many years.*

one it was completely destroyed on both sides.—*Harlemische Abhandlungen*, vol. VI. My own dissections do not agree with this statement; I have generally found the canal closed at the time of birth.

* “ Rarissimé, si unquam, talis hernia in recens natis jam
“ adest, sed testem serius protrusum aut presso pede sequitur,

It seems probable, that an accidental circumstance may give rise to the complaint, where it is strictly congenital; that an adhesion of the omentum or intestine to the testicle in the abdomen may cause these parts to pass through the ring, when the testis itself descends, or may even retard, or totally prevent the descent. In an infant, which had only one testicle in the scrotum, and died a few hours after birth, WRISBERG* found the opposite one close to the ring, and connected to the omentum by means of three slender filaments. In two congenital herniæ, which existed at the time of birth, when the contents were returned, the testis was drawn up towards the ring.† The same author also found the omentum adhering firmly to the testis, in a case which he examined in the adult, although there was no adhesion to any other part.‡ It was a preternatural con-

“ aut accidente aliquâ causâ occasionali, contenta post menses
 “ vel annos in saccum haud occlusum propelluntur.”—CAL-
 LISEN, *pars poster*, p. 494.

* *Comment. reg. soc. scient.* Goetting, 1778, p. 71.

† *Ibid.* p. 43—44.

‡ *Ibid.* p. 71.

nexion of the omentum, by a single thread, to the testicle, that rendered the rupture of the celebrated ZIMMERMAN irreducible; and for which he submitted to the operation on account of the various troublesome and painful symptoms which the complaint occasioned.* SOEMMERRING† found the appendix vermiformis adhering to the testicle. It would be useless to adduce any further instances in confirmation of this opinion, as the experience of most individuals must have furnished opportunities of observing how frequently the viscera are connected to the testis in congenital ruptures. I shall therefore content myself with referring on this point to the opinion of Mr. PORT; who not only states in general terms, that adhesions are much more frequent in this than in other ruptures, but particularly notices the strength of the connexion, which frequently subsists between the prolapsed

* MECKEL *de Morbo Hernioso congenito singulari, &c.* Berolini, 1772.

† DANZ *Zergliederungskunde des ungeborenen Kindes*, vol. II. p. 164.

viscera and the testis, and the difficulty which is experienced in destroying it.*

The symptoms and treatment of this rupture are the same which belong to the complaint in general.

It may be distinguished from a scrotal hernia by the impossibility of feeling the testicle, which part can be clearly discerned in common cases. The existence of a rupture from infancy affords also a strong suspicion that it is of this kind. And we have great reason to conclude, that a scrotal hernia in a child is of the congenital kind, although the case, related in the first chapter of this book, shews that the rule does not hold good invariably.†

As there seems to be always a disposition in that membranous canal, which connects the tunica vaginalis to the abdomen, to contract and close, this effect will probably take place in a young subject, if the viscera be replaced and maintained in their natural situation, by means of a proper truss. A radical cure of the complaint will thus be

* *Works*, vol. II. p. 162, and vol. III. p. 292, and 299.

† See p. 31.

effected. The same event cannot be looked for at a more advanced age, where the employment of a truss, as in other species of the complaint, must be regarded merely as a palliative measure.

Before the surgeon applies a truss for an inguinal or scrotal rupture in a young subject, he must not only satisfy himself that the protruded parts are fairly replaced, but that the testicle itself has arrived at it's natural situation in the scrotum. A rupture may take place in an infant when this gland has not yet quitted the abdomen. I have already mentioned two cases of scrotal hernia, in which the testis on the affected side had never passed the ring. Mr. POTT* and HALLER† have furnished us with similar instances. The application of a truss to a young subject, thus circumstanced, might prove injurious by retarding the descent of the testis. If it should have arrived only so far as the groin, the pressure of the pad on the gland may be attended with still worse effects.

* *Account of a particular species of rupture, &c.* p. 34.

† *Opera Minora*, vol. III. p. 318.

It is only necessary for me to make one remark concerning the operation for congenital hernia; viz. that the parts are often girded by a contraction of the hernial sac, not only where it communicates with the abdominal cavity, but also in other situations, where we should not have expected this occurrence. Mr. WILMER* informs us that he has generally found the stricture in these ruptures to reside in the neck of the sac, and not in the tendon of the external oblique: and Mr. POTTER† mentions an instance of remarkable narrowness in the upper part of the sac.

The last mentioned author has seen and recorded many cases where the hernial sac was contracted lower down, so as to embrace the protruded parts with great tightness. The intestine has been so closely girded by this kind of stricture after death, that it could not be withdrawn without laceration: and the omentum, from the same cause, has been converted into a firm hard substance, while above and below the contracted part

* *Pract. Obs.* p. 10.

† *Works*, vol. III. p. 299.

it still exhibited it's natural expansile state.*
WRISBERG† noticed the same circumstance in a patient whom he examined. There were two contractions of the hernial sac; and the narrowest of these was in the situation where the tunica vaginalis testis ordinarily terminates just above the testis. He ascribes the constriction to the partial accomplishment of the natural process of obliteration. The following is the only instance of the kind, which I have met with.

CASE.

— HEWER, aged twenty-four, the son of a farmer in Gloucestershire, had been occasionally troubled with a descent of the intestine into the scrotum, since the age of twelve years. Although it appeared afterwards that this rupture was of the congenital kind, it did not take place until the abovementioned age, and had descended only a very few times.

* *Works*, vol. II. p. 161 ; vol. III. p. 293, et seq.

† *Lib. citat.* p. 69 et 70.

The parts came down, whilst he was riding, on Monday, September 15, 1807; and the symptoms of incarceration very rapidly supervened. The most vigorous methods were resorted to without delay. Large bleeding from the arm, and cold applications to the part produced no benefit; and the free use of tobacco, both in the form of smoke and infusion, was equally inefficacious. The latter remedy was employed until it's full effect was exerted on the system, as appeared by a considerable reduction in the strength and number of the pulse, cold sweat, pallid countenance, great feeling of anxiety and distress, and a state of faintness, approaching to actual syncope. It is by these symptoms, and not by the length of time, nor by the quantity of the remedy consumed, that we can judge whether a fair chance is given to the patient of profiting by the powers of the tobacco.

The operation was performed on the evening of Wednesday, Sept. 17. About half way between the testis and groin, the hernial sac was so contracted, that a probe

only would pass into the stricture ; and the prolapsed parts experienced, in this situation, as close a constriction as that which they suffered from the margin of the ring. This unexpected circumstance was at first rather embarrassing ; for, as the upper division of the sac was first opened, and the communication, in consequence of the closeness of the contraction, could not be immediately discovered, a doubt arose as to the nature of the lower part of the swelling.

When the hernial sac was completely laid open, a fold of intestine was found in contact with the testis, and covered by a portion of omentum. Both these parts were of a dark reddish brown colour. The stricture, which was formed at the upper opening of the ring, would not admit the smallest portion of the tip of the finger, so that I found it necessary to employ the grooved director and curved knife for its enlargement. The intestine, which was marked by a strong impression from the situation of the stricture, was then returned with ease ; and the omentum was cut off on a level with

the ring, it's divided margin affording no hemorrhage; the latter part was immediately retracted within the abdomen.

A common glyster was injected, and small quantities of a solution of the magnesia vitriolata in mint water were repeatedly exhibited during the night; but no discharge from the bowels took place till the following day, when the patient was much relieved by several copious evacuations. His recovery proceeded in the most favourable way. A single venesection with fomentations to the abdomen was sufficient to obviate a slight tendency to inflammation. A very light and sparing diet was rigorously enforced; and no other medical assistance was required, excepting the use of the saline effervescing draughts with occasional doses of opening medicine. The abdomen continued perfectly soft and free from tension, except just above the wound; here it was rather hard, and pressure excited slight pain, for which leeches were twice applied with benefit.

He was so completely recovered by the 2nd of October, as to bear being removed

to his own home, which was several miles distant from the place where the strangulation came on.

I shall just notice here a peculiar species of hernia which has been only described of late, and the appearance of which might considerably perplex an operator, unless he was previously aware of the possibility of the occurrence. In the cases, to which I now allude, the protruded viscera, surrounded by their hernial sac, are contained in the tunica vaginalis testis. The rupture therefore must be formed when the communication with the peritoneum is closed; but before the contraction has been continued from the abdominal ring downwards. The first instance of this kind was described by Mr. HEY,* and another has been since related in Mr. COOPER's† work.

It would be necessary, in this case, after laying open the tunica vaginalis, to divide also the sac, which more immediately invests the prolapsed viscera.

* See his "Account of a new species of Scrotal Hernia," in the *Practical Obs.* p. 221, and seq.

† Pt. I. p. 59.

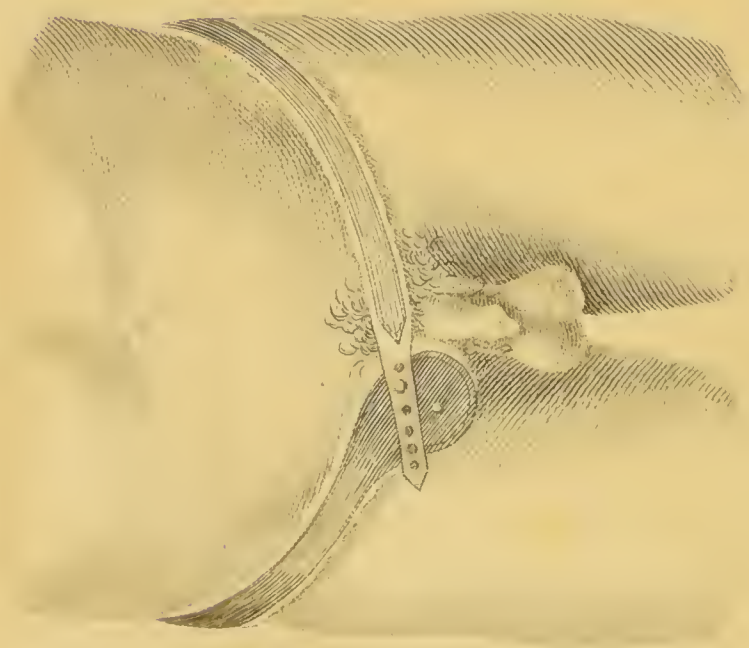


Fig. 3.

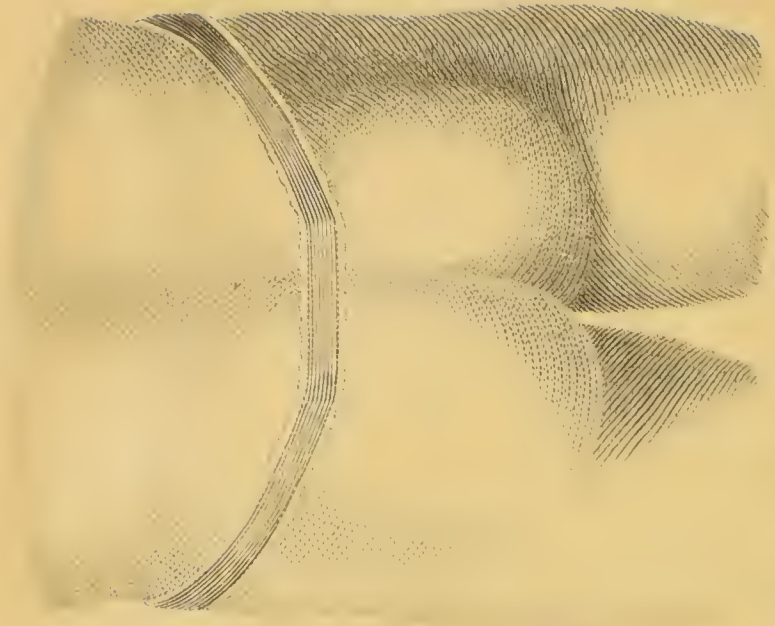


Fig. 4.



Fig. 1

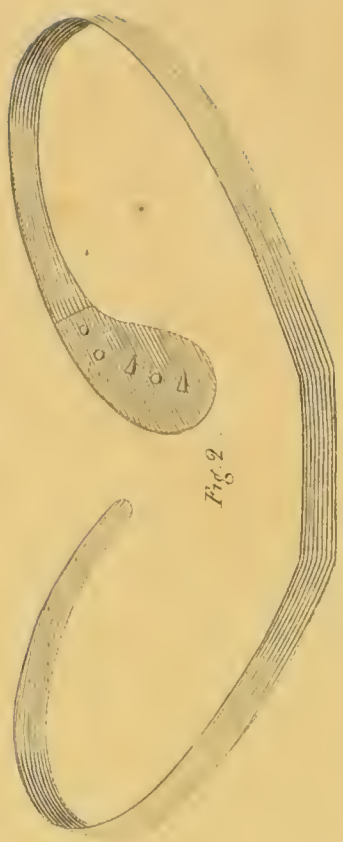


Fig. 2.

APPENDIX.

CONTAINING SOME FURTHER PARTICULARS OF
THE CASE OF ARTIFICIAL ANUS REPRESENT-
ED IN PLATE 3.

I Have lately had an opportunity of collecting a more circumstantial account of the singular case mentioned in page 208, and of procuring a drawing to exhibit the present appearance of the parts.

—JEFFERIS, of Cirencester, is now sixty years of age, and has every external appearance of health and activity. He looks indeed much younger than he really is.

His complaint was a scrotal hernia of the left side, about equal in size to a pigeon's egg, before the occurrence of the strangulation, which terminated in mortification. The testis of the same side, and a large portion of the surrounding integuments were

involved in destruction with the hernia. The progress of the case, during the mortification and recovery, presented nothing that requires to be particularly noticed. It is now nearly seventeen years since the occurrence took place; and the whole of the feces has been evacuated through the groin from that time.

He has never worn any truss, nor taken any measures to obviate the inconveniences arising from the discharge of the feces, except that of keeping always a quantity of tow in his breeches.

A prolapsus of the intestine has taken place through the artificial opening. The projecting part varies in length and size at different times. It was four inches long when I saw it; and the basis, which is the largest part, measured nearly six inches in circumference. This prolapsus never recedes entirely, but is sometimes considerably smaller. It has occasionally protruded to the length of eight or ten inches, being at the same time equal in size to the forearm, and bleeding copiously. This is attended with great pain, and only happens

when the bowels are much disordered. Warm fomentations, and a recumbent position, relieve in this case, by causing the gut to return.

The projecting part is of an uniform red colour, similar to that of florid and healthy granulations. The surface, although wrinkled and irregular, is smooth, and lubricated by a mucous secretion. It feels firm and fleshy, and can be squeezed and handled without exciting pain: it approaches on the whole to a cylindrical form, and it's anterior or loose extremity contains the opening through which the stools are voided. The basis of the swelling appears to be continuous on all sides with the integuments, and I could discover no opening of the lower end of the gut, which is probably entirely closed.

This person does not possess the slightest power of holding the stools. They are often voided very suddenly, and, to use his own expression, without giving him any notice. When the feces are fluid, they come away repeatedly in the day, and are discharged with considerable force: but when

they are of a more firm consistence, there is not more than one stool in one or two days, and their expulsion requires much straining. At these times their size is not greater than that of the little finger.

He does not confine himself to any particular diet. When he is purged, the food frequently passes with very little alteration; this he has noticed particularly of cucumber. He experiences great weakness at such times. Ale will sometimes pass off in five minutes from the time of drinking, having apparently undergone little or no alteration.

The bowels are strongly affected by slight doses of purgatives. A quantity of rhubarb, sufficient to cover the finger nail, will purge for three or four days.

FINIS.





EXPLANATION OF THE PLATES.

PLATE I.

- Fig. 1.* Front view of the spring of the Truss,
described in Chap. II.
2. Back view of the same.
3. Front-view of the Truss, as applied on
the body.
4. Back-view of the same.

PLATE II.

Shews the attachments of Paupart's ligament to the os innominatum: it is particularly designed to represent the broad insertion of the ligament into the pubes.

PLATE III.

View of the parts in a case of artificial anus.

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OBSERVATIONS

ON

CRURAL HERNIA:

TO WHICH IS PREFIXED,

A GENERAL ACCOUNT

OF THE OTHER

VARIETIES OF HERNIA:

ILLUSTRATED BY ENGRAVINGS.

BY

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THE AUTHOR.

ADVERTISEMENT.

Since these Observations were read to the Royal Society of Edinburgh, Mr Hey of Leeds, a gentleman of great experience and eminence in his profession, has published various excellent Observations on Crural Hernia, from which the Author has made Extracts, in order to render his History of Crural Hernia more perfect.

With the same view, an Extract from Dr Monro's Treatise on the Bursae Mucosae is also annexed, in the form of an Appendix.

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GENERAL OBSERVATIONS

ON

HERNIA*.

THE frequency of hernia, the occasional obscurity of its commencement, together with its fatal consequences, give this disease a strong claim to the attention of all who practise the healing art.

No rank nor condition of life gives perfect security from the attacks of this disease. The old and the young, the laborious and the idle, the corpulent and the lean, the rich and the poor, are subject to it.

A

But

* The following observations on the different species of hernia were read before the Royal Society of Edinburgh, April 19. 1802.

But though all are liable to this disease, they are not equally so ; the difference of age, sex, habit of body, and condition of life, not only give a greater or a less disposition to hernia in general, but have an influence in occasioning the particular species of the disease.

Amongst the various ranks of society, the lower classes, owing to their continued labour, are most subject to hernia : and the disease proves more certainly fatal to this description of people, as labour not only induces the complaint, but tends to increase it when formed, and poverty too often prevents their obtaining the only means capable of arresting its progress.

The frequent occurrence of the disease, and the number of useful persons disabled, or lost to the community, gave rise to a charitable institution in London ; the object of which is, to afford relief to the ruptured poor.

The records of this society afford, to a certain degree, the means of making an estimate of the proportion of persons afflicted with hernia.

Mr Turnbull, surgeon to that institution,
states

states the average as 1 to 15. “ Few men (he
 “ observes) have taken more pains to ascertain
 “ this peculiar point than myself; and, after the
 “ most diligent and general inquiries through-
 “ out the kingdom, I am induced to take them,
 “ male and female, and of all ages, upon an
 “ average of 1 to 15.” This proportion may be
 thought by some too high; but we find the truth
 of it supported by the concurring testimonies of
 foreign authors *.

As no full and accurate treatise has, as far as
 I know, been professedly written on crural her-
 nia, I have directed my attention chiefly to that
 species of the disorder.

On account of the intimate relation which
 subsists between a minute knowledge of ana-
 tomy, and the pathological history of crural her-
 nia, an anatomical description of the parts con-
 cerned in this disease, in both sexes, seems to be
 a necessary introduction to the subsequent his-

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tory

* Gimbernat and Arnaud.

tory of the complaint, as it will tend to point out not only the situation of the tumour, the effects of the protrusion on the crural arch, and the cause of the greater frequency of this complaint in the female, but also suggests the safest and surest method of removing the disease by pressure, or by a surgical operation, and also the means of preventing a return of it.

I was naturally led to this inquiry, from some opportunities, that have occurred to me, of examining the nature of this complaint in the recent subject, and from having the advantage of several preparations in my father's museum, illustrative of this kind of hernia: and also from my being able to subjoin some accurate drawings made, at my request, by that able draughtsman and anatomist, Mr Fyfe.

But, before entering upon the immediate object of my inquiry, it may not be improper to premise a short account of hernia in general; as, by comparing the various forms of this disease, the peculiarities of crural hernia will be more obvious.

OF THE NATURE AND VARIOUS FORMS OF
HERNIA.

By the word Hernia is generally understood, in the language of surgery, an external tumour, formed by a protrusion of the bowels through one or other of the openings through the abdominal muscles, where the umbilical, spermatic, or crural * vessels pass out, or round ligament of the female uterus.

The sac of the tumour is formed by the peritoneum, and, within it, are contained an aqueous fluid, the omentum, a portion of the alimentary canal, or other viscera of the abdomen.

Different names have been applied to the various species of hernia, descriptive of the age of the subject afflicted by the disease, or of the situation of the tumour: hence the term her-

A iij

nia

* The term *crural* is meant to include the femoral, sciatic, and obturator blood-vessels, as all of these are spent on the upper part of the thigh.

nia congenita, as it appears at or soon after birth.

Exomphalos, or umbilical hernia:

Bubonocoele, or inguinal hernia.

Hernia Scrotalis.

Merocele, or crural hernia.

Ifchiatocele, where bowels protrude through the ischiatic notch of the os innominatum.

Ovularis obturatoria, where bowels protrude through the oval aperture in the ligamentum thyroideum, along with the obturator blood-vessels.

Hernia perinei, where tumour appears at the perineum.

Another distinction of herniae is mentioned by surgical authors, arising from the different contents of the hernial tumour.

Enterocoele, where the intestines are protruded.

Epiplocele, where the omentum is protruded.

Entero-epiplocele, where the omentum and a portion of the intestine, are contained within the same tumour.

Cystocoele,

Cystocele, where the bladder of urine is protruded.

Hysterocele, where the uterus is protruded.

Hepatocele, where the liver is protruded.

And, Splenocele, where the spleen is protruded.

Besides the above species of herniae, where the bowels are protruded through what are called natural openings in the abdominal muscles, there are other examples of herniae, in which the bowels have been forced through some other of the parietes of the abdomen, which have been called Ventral Herniae.

Ventral herniae are generally situated in the middle, or at the side of the linea alba, or linea femilunaris. The tumour is of various sizes : in some instances, it is very large, and contains within it a portion of the stomach. In other instances, there are two or more small tumours at the side of the linea alba, or femilunaris, which disappear on pressure, as the diameter of the base of the tumour is equal to that of any other part of it.

Sabatier describes another very rare ventral hernia in these words: “*Quequefois aussi elles (boyeaux) se déplacent par un écartement des fibres de ce muscle près l’anneau.*”

Another extraordinary form of ventral hernia, and which may be looked upon as a *lufus naturae*, occurred to my father. He was consulted, along with Dr Farquharson, respecting the nature of two tumours, which were covered by the skin alone, on each side of the back of a child, six months old, immediately under the false ribs.

Each tumour, upon an accurate examination, was found to contain a kidney, which could readily be reduced through an oval ring, of a considerable size.

OF INTERNAL PROTRUSIONS OF THE BOWELS, IMPROPERLY CALLED HERNIAE.

BESIDES the external protrusions of the bowels, which constitute the different forms of herniae,
above

above enumerated, there are also instances of internal protrusions, which, though not coming under the general definition of hernia, yet, from their analogy to this disease, deserve to be taken notice of, when treating of this subject.

A part of the intestine, generally a part of the great arch of the colon, has been observed to pass through an aperture in the diaphragm.

This unnatural appearance was probably the consequence of original malconformation, as the sides of the aperture were found perfectly smooth, which could not have been the case, had it been the consequence of rupture, from violent muscular exertion. Such apertures have been discovered in persons of different ages, who generally died in consequence of strangulation of that part of the colon, which passed through the diaphragm, or in consequence of the displaced bowel impeding the free action of the heart and lungs.

Such a *lufus naturæ* in the diaphragm was sent to my father, by Dr Paterfon, with a letter
(dated

(dated Ayr, 1793,) giving the subsequent history of the case.

A young woman, of 22 years of age, had been occasionally subject, during the greater part of her life, to pain in the left side, under the false ribs. This was generally succeeded by pains throughout the whole belly, resembling colick pains; and was attended with some degree of costiveness. These complaints commonly wore off in a few days, and she was most subject to them at the period of menstruation. Having danced violently on a Saturday evening, she was seized on the Sunday morning, in the manner above described. In the afternoon, she was seized with a violent vomiting, and with excruciating pains in the side, and belly, which lasted during the whole night. An injection was given about 10 o'clock, which procured a considerable discharge of faeces, but without any relief. She continued drinking large quantities of water-gruel, and throwing it up almost immediately, till about 10 o'clock next forenoon, when she expired.

She

She was never observed to have any shortness or difficulty in breathing, and lay alike well on both sides. The body was opened the following morning, and, although only 22 hours after death, it was unusually putrid. The bowels were much distended with air, and the drink she had swallowed, was effused into the cavity of the abdomen. This I found to arise from an opening through the coats of the stomach, nearly in the middle of its great curvature. On examining the intestines, I found that a large portion of the colon had passed through an opening in the middle of the left side of the diaphragm, into the cavity of the thorax; and lay behind the heart and lungs.

This tumour exceeded the size of a person's fist, and appeared to be strangulated, for all the blood-vessels were turgid, as if they had been injected, and the gut was with difficulty drawn back into the cavity of the abdomen. On examining the opening through the diaphragm, I found it surrounded by a callous ring, and to have every appearance of having been of long standing,

standing, or more probably an original defect. A thin pellucid membrane was connected with part of the edge of the ring, and a sort of process from this membrane, extended along the tumour into the cavity of the thorax.

From the symptoms which preceded the death of this woman, and from the history of the appearances discovered upon dissection, it appears to me, that the violent exercise she had taken, forced, through the praeternatural aperture in the diaphragm, more of the colon, which brought on strangulation.

The aperture is of an oval shape, and, though considerably shrunk, from having been dried, still measures two inches and a half in length, and one inch and a half in breadth.

A singular instance of internal protrusion, undescribed by any author, occurred to my very learned colleague, Dr Rutherford. In this instance, there is a praeternatural aperture in the mesentery, through which a portion of the ileum had protruded, and was strangulated; the bowels being twisted in a very extraordinary

nary

nary manner *. The patient, a female, died in consequence of inflammation in her bowels. The portion of the ileum, which passed through the mesentery, was found strangulated †.

Another variety of internal hernia is produced, in consequence of the villous and cellular coats of the intestines being forced through the muscular coats, in the same manner as pouches are formed in the bladder of urine. In my father's museum, there are two examples of blind sacs communicating with the ileum, and which were probably formed in that manner.

There is still another variety of internal hernia, which is produced by a turn of intestine passing around another portion, and compressing it so much, as to bring on strangulation.

It has been observed, that *intestinula caeca* sometimes grow out from the intestines. In a remarkable case ‡, one of these passed around a
portion

* Vid. Tab. 1. Fig. 1.

† Since the above was written, I found an instance of hernia through the mesocolon, described in the *Act. Nat. Cur.*

‡ Vid. Plate 7th,

portion of the small intestines, and its end was fixed down by a ligament. It so greatly compressed the portion of intestine, around which it passed, as to bring on inflammation and mortification.

HERNIA ACUTE OR CHRONIC.

BESIDES the distinction of hernia above stated, there is another, perhaps still more essential, and equally obvious. I mean the distinction of hernia as an acute or chronic disease.

In the former, the disease comes on rapidly, is the immediate result of violent muscular exertion; in many instances creates a very great degree of pain, and, if means are not taken to avert its progress, soon proves fatal, from the strangulation and inflammation of the bowels.

In the latter, the bowels are gradually protruded, without any known previous accident, are easily returned, and remain down without strangulation; and the patient may enjoy a tolerable share of health, by due attention to diet,
and

and the state of his body. And there are instances of persons, who, though subject to hernia, during the whole of a long life, have not suffered any great degree of inconvenience from it. This may be accounted for from their relaxed habit of body, and the increased size of the ring, which allows the bowels to pass and repass freely through it.

But the disease, even in such habits of body, and under such circumstances, is not entirely free from risk; strangulation being sometime induced, from violent exercise, from the actions of coughing, vomiting, or sneezing, or from indigestion, producing an extraordinary quantity of air within the alimentary canal.

In the acute species of hernia, the stricture of the ring on the protruded bowels seems to be the principal obstacle to the reduction of the tumour; whereas, in the chronic hernia, the thickening of the neck of the sac, which is, in many cases, produced by the pad of the truss being injudiciously applied, and the praeternatural adhesion of some portion of the contents of the

fac to the fac ; or, what happens very rarely, a contraction in some part of the sac, render it very difficult, nay impossible, to remove the tumour.

OF THE CONTENTS OF THE HERNIARY SAC.

FROM the definition we have given of hernia, it is evident that a portion of the moveable bowels generally constitutes the essential part of the tumour ; and the smaller intestines, having the longest mesentery, consequently the most moveable part, are most frequently found within the tumour.

Where a part of the arch of the colon is included in a herniary sac, it carries along with it a part of the omentum. But any other loose part of the intestinal canal, may carry with, or push before it, a part of the omentum, as this is unattached at its lower extremity.

Herniae, therefore, are commonly found to contain, not only a portion of the alimentary canal, but also of the omentum ; more especially

cially in fat or in elderly people : and sometimes the omentum, by adhering to the herniary sac, divides it into two distinct cavities.

In the ventral hernia, even a portion of the stomach may be protruded ; in which case, the size of the tumour increases in a remarkable manner, immediately after taking any kind of drink or nourishment.

It may be worth while to make mention of a variety of the contents of a herniary sac, which sometimes, though very rarely, occurs. The history of such a case was communicated by Dr Wardrop to my father, who, after opening the herniary sac of a bubonocoele, found that a portion of intestine was much distended by air, and could not be returned into the cavity of the abdomen.

Upon an accurate examination of this portion of intestine, it was found that there was no communication betwixt it, and the rest of the alimentary canal. It seems probable that, in this instance, the pressure of the ring of the abdominal muscles was so great, as to produce inflammation,

flammation, and adhesion of the opposite sides of that portion of intestine.

He, therefore, cut off this portion of intestine; and no bad consequence followed.

Hence this was undoubtedly an instance of a *lusus naturae* (which is not very unfrequent, as five or six examples of it are preserved in my father's museum), in which a *cul de sac* grows out from the intestine.

Besides a portion of alimentary canal and omentum, herniary tumours are, on many occasions, found to contain a small quantity of a ferous or watery fluid, which is probably effused in consequence of the stricture of the ring compressing the veins which pass upwards from the protruded portion of intestine, by which there is a greater push against the exhalant vessels, and a greater secretion of this liquor than usual.

The nature and consistence of this liquor is found to vary, according to the preceding state of the bowels within the herniary sac.

The size of the tumour is also occasionally increased or diminished, from a portion of air contained

tained within the protruded intestine ; a circumstance which is most observable in herniae of a large size, and of long standing.

OF THE EFFECTS OF HERNIA UPON THE BOWELS.

IN every instance of hernia, where the bowels cannot be returned into the cavity of the abdomen, one or other of the following consequences may be expected.

In the acute species, or where the protrusion of the bowels is sudden, and accompanied by a considerable degree of pain ; strangulation, ileus, and death, are the usual consequences.

But where the strangulation is not complete, where the inflammation, less violent, does not immediately terminate in ileus and death, it occasions a considerable degree of thickness of the herniary sac, particularly at its neck ; an adhesion of it to the surrounding parts ; and constitutes an incurable form of chronic hernia. This species of the disease, however, is less frequently

the consequence of acute hernia, than of that which comes on in a slow and insensible manner, the protrusion not being accompanied with stricture, or with pain; and, where the bowels have remained a long time down, without producing any alarming symptom.

In a few hours after strangulation, in many instances, an effusion of coagulable lymph may be observed on the surface of the intestine. The thickness of this varies in different instances *.

There is probably a similar effusion between the coats of the protruded intestine, as the effusion on the surface cannot sufficiently account for the remarkable increase of the size.

Fig. 2d of plate 5 th, shows a part of the ileum, which had been protruded in a case of crural hernia, adhering to the under portion of the sac that contained it, by means of a layer of coagulable lymph of considerable thickness.

The omentum also often adheres to the neck,
side,

* Vid. Tab. 2d. Fig. 1st shows an instance of such an effusion, in which the layer of coagulable lymph was about the thickness of a piece of gold leaf.

side, or under part of the herniary sac. In such a case, the hernia cannot be reduced ; nor can pressure be applied in such a manner as to prevent the other bowels from descending into the sac.

The intestines are sometimes of a dark brown or black colour, although no mortification has taken place. This is chiefly owing to the veins of the loose internal cellular coat being gorged with blood, the colour of which shines through the other coats of the bowels ; and also to a similar circumstance on the surface of the intestine ; in this instance, the blood having been previously pressed out of the vessels, they soon fill again. When mortification has affected the bowels, it renders them so tender and flabby, that, when handled, they tear like a piece of wetted paper *.

In some cases, mortification is the means by which the patient's life is protracted : For, in some instances of the inguinal hernia, it happens,

B iij

that

* Vid. Diagnosis, for an account of the other symptoms of mortification of the bowels.

that the protruded portion of intestine is thus cast off; and from the part of intestine above the protruded portion adhering to the ring, the patient drags on a miserable life; the faeces passing through a praeternatural anus, at the ring of the abdominal muscles.

In some cases of scrotal hernia, the pressure of the bowels destroys the testicle, or brings on an induration of the omentum.

OF THE NATURE OF THE HERNIARY SAC.

THE herniary sac is formed by the peritoneum, or membrane which lines the abdominal muscles, pushed forwards by the protruded bowels; or, in other words, the herniary sac is formed by a portion of elongated peritoneum.

In a common case of hernia congenita, the process of peritoneum, which afterwards forms the tunica vaginalis, covers the protruded bowels.

In the usual instances of scrotal hernia, the
spermatic

Spermatic chord and testis are usually placed at the posterior part of the tumour, covered by its original process of peritoneum, the under part of which anatomists call its vaginal coat, and the bowels are placed before it, and contained within another portion of peritoneum, which has been pushed out by the protruded bowels.

In cases of cyстоcele, the herniary tumour has not the usual sac.

An unusual variety of herniary sac has been described by Mr Hey, of Leeds, which he met with in a child 15 months old *.

The

* In the hernia which I am describing, the intestine was protruded after the aperture in the abdomen was closed; and therefore the peritoneum was carried down along with the intestine, and formed the hernial sac. It is evident also, that the hernia must have been produced while the original tunica vaginalis remained in the form of a bag as high as the abdominal ring; on which account that tunic would receive the hernial sac with its included intestine, and permit the sac to come into contact with the testicle. The proper hernial sac, remaining constantly in its prolapsed state, contracted an adhesion to the original process of the peritoneum which surrounded it, except at its inferior extremity: there the external surface of the hernial sac was smooth and shining, as the interior surface of the tunica vaginalis is in its natural state.

From all these circumstances it is evident, that this hernia differed

The sac, especially the neck of it, in cases of chronic herniae, has been found of a considerable thickness, and sometimes evidently consisting of a number of layers, and having a sufficient aperture to let the bowels pass and repass, without risk of strangulation.

In other cases, the sac has been found to have undergone an opposite change ; instead of thicker, having become thinner than natural ; probably from the absorbent vessels, in consequence of irritation, being stimulated to take on an unnatural degree of action.

A singular instance of this kind is preserved by my father in his museum, where the bowels of an umbilical hernia appear to be covered by the skin only.

The herniary sac has been, in several instances, destroyed by ulceration.

Mr

ed both from the common scrotal rupture, in which the hernial sac lies on the outside of the tunica vaginalis ; and also from the hernia congenita, where the prolapsed part comes into contact with the testicle, having no other hernial sac besides the tunica vaginalis.

Mr Ruffel, furgeon, informed me of a cafe, where the fac of the hernia had become fo transparent, that the vermiform contractions of the bowels were diftinctly feen through it *.

There are instances upon record, in which the herniary fac had become fo thin as to burft from a flight degree of violence.

In different chirurgical authors, as Arnaud, &c. there are instances recorded, in which there were two herniary facs, and with different paffages of communication with the abdomen.

Tab.2d, fig.2d, represents a variety of that form of difeafe which, as far as I know, is not defcribed by any author. It occurred in the perfon of a woman, who died in confequence of the operation for hernia. In this instance, a fmall herniary fac was found at the fide of a much larger one ; and, within the larger herniary fac, (which was filled only with bloody water), there were two fmaller herniary facs : fo that there are four diftinct facs. When the operation was performed,

* The fame obfervation was made by Dr Marshall, reader on anatomy in London.

formed, it was necessary not only to cut through the larger sac, but also to divide the smaller sacs, before the intestines were exposed *.

Mr Hunter, in his catalogue, when describing this preparation, observes, that it strongly illustrates one or other of the following circumstances: either the mode in which an old hernia is formed, or the process by which hernia is cured. But which of these processes was going on is very difficult to determine, as the previous history of the patient is not given in Mr Hunter's catalogue †.

It may be worth while to add, that, in consequence of the distention of the skin and cellular membrane over the sac, these become, in some instances, thicker than usual.

The degree of thickening of these parts depends, in some measure, upon the size of the tumour,

* This table was taken from a preparation in the collection of the Royal College of Surgeons of London; and I am indebted to my very worthy friend, Dr Baillie, for it, as he got me their permission to take the drawing.

† Vid. Figures 2d and 3d of Tab. 2d.

mour, and duration of the disease, and takes place to the greatest extent in old herniae.

OF THE GENERAL CAUSES OF HERNIA.

THE causes of hernia are various and opposite.

1st, Sudden and violent muscular exertion.

2d, Blows upon the abdomen.

3d, Debility, or a partial degree of relaxation in the natural passages through the abdominal muscles.

4th, An unusual enlargement of one or other of the viscera of the abdomen or pelvis, so as to occasion distention of the parietes of the abdomen.

5th, An enlargement of the passage through the abdominal muscles by disease.

To the first head may be assigned all those instances of hernia, occasioned by the violent action of the diaphragm and abdominal muscles, as in raising and carrying heavy weights, or in leaping ;

leaping ; during the actions of vomiting, coughing, or laughing; or during the straining, in the exclusion of indurated faeces, or of the foetus in cases of difficult parturition.

Herniae, when produced in this manner, are the immediate consequence of the exertion, and attended with a considerable degree of pain.

To the 3d head may be referred all those instances of hernia which we meet with in infants ; and in females, naturally of a relaxed habit of body, whose constitutions have been enfeebled or broken down by having had many children; or, by age ; by long residence in a warm or moist climate ; by a sedentary life, or improper diet ; by bad health or the abuse of medicines *.

Dr Camper is of opinion that the relaxation of the mesentery concurs with the relaxation of the
abdominal

* I attended a tall young man, of a weak habit of body, who, on account of a venereal eruption, was obliged to confine himself to his room for some time, and to take a considerable quantity of mercury ; in consequence of taking violent exercise upon getting abroad, he was seized with a hernia in each groin on the same day.

abdominal muscles in the formation of this disease *.

It may be observed, likewise, that the disposition to hernia is peculiar to certain families; for, in some instances, it seems hereditary.

Those who are afflicted with hernia, in consequence of debility, seldom run much risk of strangulation. They are subject to a degree of fulness, sense of weight and pressure, and tension in the groin scarcely amounting to pain, which are increased by coughing, flatulency, or after violent exercise.

The tumour is at first small, becomes very gradually larger; and the pain is so trifling, that the patient, until the tumour has increased to a considerable size, remains ignorant of the nature of his disease.

Whether the ventral hernia is owing to the first or second of these causes, is still undetermined.

Most authors suppose that this form of hernia arises

* “Relaxatur vero etiam mesenterium, ceditque vi muscutorum abdominis ac diaphragmatis; urgetur, propellitur, propter inguinum laxitatem, intestinum, omentum, sæpe utrumque.”

Vid. CAMPER de Bubonoccl. page 11th.

arises in consequence of the relaxation of the muscular fibres of the parietes of the abdomen. But, it appears to me more probable, that it is generally occasioned by a rupture of some of the tendinous fibres ; as it happens most commonly at the linea alba ; occurs most frequently in robust young persons ; and is the immediate consequence of violent muscular exertion.

It may possibly likewise be the consequence of a partial weakness of the abdominal muscles, caused by absorption of part of their fibres. Do not the instances observed of general absorption, render such partial absorptions somewhat probable ?

The two causes of herniae above mentioned, viz. strong muscular action and partial debility, seem diametrically opposite to each other. Yet it cannot be doubted, however paradoxical it may appear, that these very opposite causes sometimes concur in the formation of the disease. A proof of this, is the frequent occurrence of the complaint among the negroes in the West Indies, equally exposed to the relaxing effect

effect of a warm climate, and to long and great muscular exertion.

An unusual increase in the bulk of any of the viscera of the abdomen or pelvis, to such a degree, as to occasion distention in the parietes of the abdomen, I have enumerated as a 4th cause of hernia.

To this may be imputed the frequency of umbilical hernia amongst old fat women. And hence, also, the umbilical hernia is the consequence of pregnancy; especially in women who have had many children, and at short intervals.

Authors, who describe the state of pregnancy, mention the projection of the navel, as a common symptom. The umbilical ring, in such cases, being distended beyond its natural size, is apt to remain so; and, consequently, the enlargement of the navel to continue, especially in women of a relaxed habit of body, even after delivery. This enlargement becomes greater and greater in every future pregnancy, until at last it terminates in a perfect umbilical hernia.

As

As all causes which enlarge the ring in the abdominal muscles, predispose to inguinal hernia, it seems probable, that the enlargement of the ring, in consequence of the testes passing through it, may be a predisposing cause of hernia congenita, or bubonocoele, and it has been observed, that by far the greatest number of children afflicted with hernia, are males.

A disease in the blood vessels of the spermatic chord produces the same effect. My father informed me of the case of a man, whom he attended, in which varix of the veins of the spermatic chord of the left side, of many years standing, seemed to have paved the way for an inguinal hernia.

The testes stopping at the ring, instead of passing down into the scrotum, as sometimes happens in adults, is another source of inguinal hernia.

Having given an account of the causes and various species of hernia; it may be necessary to point out the peculiarities of age and sex,

sex, or of constitution, more or less favourable to the different forms of hernia.

The foetus in utero, from not having breathed, and other causes, has not been found afflicted with hernia. Infants, especially in the first month after birth, if proper pressure has not been applied to the part, are extremely liable to suffer from umbilical hernia. If boys, the disease is less formidable, and of less consequence, as they commonly outgrow it ; but, in girls, it often lays the foundation of the complaint, especially when they become pregnant at an after period of life.

Boys are most subject to hernia congenita, at or immediately after birth, as the canals through which the testes pass into the scrotum are not always then shut*.

c

Dr

* Infants of the female sex may be afflicted with a species of hernia congenita, as a canal, formed by the peritoneum, passes through the spermatic ring. This canal is about half an inch in length, and ends in a cul de sac. Vide Nuck Adenographia. Dr Camper informs us, that he found this canal open only in 3 of 14 female infants after birth ; and he adds, that he had discovered traces of that canal in women who died during delivery. Vid. Acad. Haarlem, tom. vi. and vii.

Dr Camper gives us * the following observations with respect to the obliteration of that canal: he examined, for that purpose, the bodies of 17 new-born male children.

In 11, the canal was open on both sides.

In 3, a portion on the right side was open.

In 2, a portion on the left side was open.

In 1 only, the canal was obliterated on both sides.

Men are also sometimes afflicted with hernia congenita, owing to the original passage betwixt the abdomen and scrotum remaining open, and to the testes stopping at the ring of the abdominal muscles, instead of passing into the scrotum.

The testis keeps the uppermost part of the passage open, and it enlarges by the growth of the testicle. The bowels readily slip down into this passage, and are strangulated within it, in consequence of some violent exertion.

Such herniae can always be traced from the birth of the patient.

Women

* Vid. Acad. de Haarlem, tom. vi.

Women, from corpulency, frequent pregnancy, or difficult labour, are often affected with umbilical hernia. They are also, for a reason which I shall endeavour to assign in the subsequent part of this paper, more subject to crural hernia than men.

Boys and men are more subject to bubonocoele than women, owing to the spermatic chord being of a much larger size than the round ligament of the womb; and perhaps also from the rings in boys being a little enlarged by the testes passing through them.

The young, active, and robust, are most frequently afflicted with ventral hernia.

OF THE DIAGNOSIS.

As, in the preceding part of this paper, a general account has been already given of the nature and varieties of herniae (with the exception of diaphragmatic hernia), it is only necessary in this chapter to enumerate those

symptoms which indicate the approach of the complaint, and those which are common to all kinds of the disease.

A constant sense of uneasiness or pressure around the groin, increased by coughing or exercise, and distinguishable by the hand applied to the groin, and occurring in a person of a relaxed habit of body, is, in many examples, the forerunner of hernia.

The situation, sudden appearance of the tumour, and sex of the patient, in some measure point out the nature of the disease ; but it is still more certainly, in some cases, determined by an accurate examination of the tumour, while the patient is in different postures. The sensation arising from the examination of such tumours will vary according to the nature of its contents.

When a portion of intestine only is included within the herniary sac, the tumour is soft and elastic, and seems as if filled with air : its contents seem to glide or to slip upon each other ; it disappears frequently with a gurgling noise

noise upon pressure, or when the patient lies down ; it re-appears when he gets up. When the patient coughs, the tumour presses on the hand of the person who is employed in examining it ; when the hand is removed, it increases in size. When a portion of the omentum is also included within the herniary sac, the tumour feels knotty, and is generally larger than where there is nothing but intestine within it ; but if a quantity of faeculent matter is contained within the intestine, within the hernial sac, it is evident that such a tumour may bear an imposing resemblance to that containing omentum : hence the diagnostic symptoms must be drawn, not from the sensation which the touch communicates, but from the other concomitant symptoms.

The symptoms in the acute and chronic species of herniae are very different. The symptoms of the acute species very much resemble those of ileus, they vary a little, and come on more or less rapidly, according to the degree of stricture upon the protruded portion of bowel,

and according to the constitution of the patient.

The patient suffers very much from pain in the tumour propagated to other parts of the alimentary canal, which is soon followed by inflammation.

From the remarkable degree of sympathy subsisting between different parts of the alimentary canal, its action is inverted in cases of strangulated hernia ; nausea, excessive sickness, and vomiting, follow ; and, in some instances, a brownish yellow faeculent matter has been rejected by vomiting.

Nothing passes through the body.

In some instances, convulsions are the effect of hernia, and sometimes tetanus.

The pulse is generally small and quick, but sometimes not affected, though inflammation has been found to have occupied the protruded portion of intestine.

The skin is generally hot and parched. In the latter species of hernia, even where the protruded portion of bowel cannot be returned,

ed, the degree of constriction is so inconsiderable as not to impede the free circulation of blood through the vessels, nor the free passage of faeces through the protruded portion of intestine; so that, in this state of disease, the patient, by preventing costiveness, and by attention to diet, may enjoy a tolerable share of health.

Mr Callisen * gives the following catalogue of symptoms, for assisting the surgeon in discovering whether or not there is an adhesion between the protruding portion of intestine and herniary sac :

Signa specialia, quae adhesionem partium elapsarum aut inter se, aut cum sacco hernioso, ejusque naturam agglutinativam, fibrosam, fungosam, totalem intimumque coalitum indicant, ex herniae vetustate, et longiore extra abdomen mora, partiali aut totali immobilitate, absque incarcerationis notis, interdum tamen, cum hoc statu juncta, desumuntur ; (he very justly adds), certitudine tamen carent, donec,

* Vid. System. Chirurg. Hodiern. pag. 452. vol. 2. edit. 2da.

donec, incisione adhibita, clarius elucescat mali natura.

The symptoms of gangrene having affected the hernial tumour are, pain in it suddenly ceasing, though the strangulation has not been removed ; pain in the abdomen, as inflammation in other parts of intestine has not run on to gangrene ; tumour so flaccid as to retain the marks of the pressure of the finger ; leaden or blackish colour of the tumour ; separation of parts of its cuticle ; little vesicles under the cuticle ; sinking of the pulse, and coldness of the extremities.

May we not conjecture that a patient labours under diaphragmatic hernia, providing he is afflicted with the usual symptoms of hernia, without any external tumour, when he has had a degree of difficulty in breathing during the greater part of his life, when all the symptoms are much aggravated by violent exercise, and when a sound like that of borborygmi may be heard in the thorax, when the patient ceases for a moment to act with his diaphragm, or to move his ribs ?

OF THE PROGNOSIS.

IN every species of hernia, the prognosis is unfavourable, in so far, at least, as relates to the complete recovery of the patient.

In the early part of life, indeed, the disease is often cured by pressure alone, especially in cases of umbilical hernia in children; and there are instances of a complete cure being performed, in this way, on persons more advanced in life, though these are not very numerous, as the disease, though in appearance cured, is apt to recur.

It is, therefore, from a surgical operation only, that persons of a certain age can expect a perfect cure; but though the disease is in general only to be palliated, it seldom proves fatal, unless from accident or neglect: because, when the hernia can be returned and retained by proper pressure, all danger is avoided.

The prognosis depends upon the nature of
the

the contents of the hernial tumour, as the danger arises from the degree of stricture upon these. If the omentum only is protruded, no bad consequence generally ensues, as it does not seem to serve any very essential purpose in the animal economy, unless the degree of stricture is so great as to impede the free circulation of blood through the protruded portion, which produces mortification, and, in some examples, the death of the patient.

Protrusions of the omentum are to be regarded with a suspicious eye on another account, as they often pave the way for a protrusion of a portion of intestine; and also as the omentum, when once down, does not so readily return into the cavity of the abdomen, as a portion of intestine; or the stricture produces, in some cases, an induration or enlargement in the protruded omentum, which cannot, in that state, be returned through the neck of the sac. In those cases where, owing to an adhesion of the omentum to the sac, pressure cannot be applied with advantage, the ring is

is commonly so much enlarged as to preclude all danger of strangulation ; and persons afflicted with such chronic herniae have less chance of obtaining a radical cure than those afflicted with the acute herniae.

In the acute hernia, there is always great danger, if the bowels cannot be immediately returned, as inflammation and its fatal consequences, so quickly and so certainly follow ; and, in chronic hernia, the complaint has been known to terminate fatally, from stricture of the intestine, when very little pain or inflammation had been induced, and where the medical attendants had, from such circumstances, been lulled into a fatal security.

ON CRURAL HERNIA.

HAVING premised such general observations as seem necessary for explaining and elucidating the nature of hernia in general, I shall now proceed to explain the peculiar nature of crural hernia, the manner in which the crural arch is affected in the disease, the relative situation of the neighbouring blood-vessels and nerves in respect to the tumour, the effects of the stricture of the crural ring upon the contents of the tumour and its sac, and the peculiar symptoms of crural hernia. I shall then consider what prognosis may be formed, and, lastly, point out the safest mode of removing the complaint by a surgical operation.

As was proposed, I shall premise an anatomical description of the crural arch.

ANATOMICAL DESCRIPTION OF THE
CRURAL ARCH.

MR GIMBERNAT is the only author who appears to have examined the structure of the crural arch with that attention which the importance of the subject requires.

From the peculiar structure of parts, he has in part explained the reason why crural hernia is less frequent than bubonoccele, and has also pointed out not only the safest, but also the surest mode of taking off the stricture upon the protruded portion of intestine, or of performing the operation for crural hernia. His description is, however, rather too minute, and somewhat obscure; chiefly owing to the want of suitable plates, for the plates annexed to the English translation of his treatise (which, I presume, were faithfully copied from the original plates) are executed in such a manner as by no means to illustrate properly the text of the author. Besides, even though well executed,

cuted, they do not appear to me to exhibit such views of those parts, as can convey an accurate idea of the situation or structure of the crural arch.

Another great imperfection, which applies equally to Mr Gimbernat's description and plates, is, that he describes and exhibits views of the crural arch in the male subject only, which I have discovered to be materially different in structure in the female, although the knowledge of the parts in the female is of infinitely more moment, as women are most liable to crural hernia.

Mr Hey observes, page 150 : " I have now performed the operation for the femoral hernia 14 times in the female, and twice in the male : " and, in page 154, he observes, " In all the instances of strangulated intestinal hernia in females, which have occurred in my practice, the hernia was of the femoral kind *."

OF

* Vid. Practical Observ. in Surgery,

OF THE STRUCTURE OF THE UNDER PORTION OF
THE TENDON OF THE EXTERNAL OBLIQUE
MUSCLE OF THE ABDOMEN, FORMERLY CALLED
LIGAMENT OF POUPART OR FALLOPIUS, NOW
CRURAL ARCH.

IN drawing out this description of the crural arch, I have, in several particulars, availed myself of the previous labours of Albinus and Gimbernat.

A strong and broad tendinous aponeurosis is attached to the lower portion of the external oblique muscle of the abdomen. The stronger fibres of that aponeurosis descend obliquely inwards and downwards, and are disposed nearly parallel with respect to each other: there are also many thin tendinous fibres which pass across the larger fibres, and which describe a small part of a circle, and are directed upwards.

The tendon is fixed to the anterior spinous process of the ileum, and its lowest part to
the

the ossa pubis and their synchondrosis; and is described by Mr Gimbernat, as forming a duplicature inwards, and as forming a canal for the spermatic vessels in the male, and the round ligament of the womb in the female. On pressing the under part of the tendon between the finger and thumb, it feels thicker than any other part of the tendon, and there seems to be a certain proportion of ligamentous matter added to it.

It is thicker and broader towards the ossa pubis, than near the anterior superior spinous process of the ileum.

The aponeurosis of the external oblique muscle divides into bands, to form the inguinal ring, one of which goes before, the other goes behind the spermatic chord of the male, or round ligament of the female.

That which passes behind, is inserted into the crest of the pubis.

This division of the fibres of the tendon into two chords, which form the ring, takes place in some subjects, two or three inches above the ring; in others, near the ring.

The

The intermediate substance is covered by a very thin tendinous aponeurosis, through which the fibres of the internal oblique muscle are seen, and the cremaster muscle in the male.

The ring is somewhat of an oval figure, and there is a small quantity of cellular substance, and scattering tendinous fibres within it.

The spermatic chord of the male, and round ligament of the womb in females, passes through it.

The tendinous aponeurosis, which covers the muscles of the thigh, is said to take its origin from the crural arch; we should rather say, it is strongly connected to the crural arch, for the fibres of both aponeuroses seem to be interwoven. This intimate union of parts keeps the crural arch tight; upon bending the thigh, or cutting the fascia of the thigh, the crural arch is relaxed.

The crural blood-vessels, lymphatics of the inferior extremities, and tendons of the inter-

nal iliac and great psoas muscles and bowels, in cases of crural hernia, pass behind the crural arch.

As no verbal description can convey so accurate an idea of the relative situation of the internal parts as a plate, instead of delivering a full account, in words, of the structure of the crural arch on its inner side, I refer the reader to the explanation of plate 3d, fig. 1st, and plate 4th, fig. 2d.

The thickened portion of the tendinous aponeurosis of the external oblique muscle somewhat resembles a vault, and hence it is called crural arch.

A little below this ligament, or aponeurosis, next to the pubis, a duplicature of aponeurosis is placed, which passes upwards and inwards, and is attached to the aponeurosis which covers the internal iliac muscle: This duplicature Mr Gimbernath names the internal edge of the crural arch. Vid. a, b, c, d, tab. 3d, fig. 1st. *

This

* This part, marked by letters c, d, plate 3d, fig. 1st, is divided by him in performing his operation for crural hernia.

This duplicature may be distinctly perceived by passing a finger along the external iliac blood-vessels (the abdomen having been previously laid open), into the aponeurotic sheath of the external iliac artery and vein.

It presents a firm and resisting surface ; its edge is very thin ; and I discovered that it is considerably broader in the male than in the female.

When the thigh and leg are raised to nearly a right angle with the body, the internal edge of the crural arch is much less distinctly felt, than when every part of the body is in the horizontal position ; and hence, in such a posture, the bowels may not only more readily push downwards, and form a crural hernia, but, when down, they will be more readily returned into the cavity of the abdomen.

Hence the surgeon should, while attempting what surgeons call the taxis, or, in plainer language, an attempt to return the protruded bowels into the abdomen, always bend the

thigh of that side to nearly a right angle with the body.

The round ligament of the uterus passes obliquely through the abdominal muscles, and is surrounded by cellular substance, which Mr Gimbernath describes as forming a canal. A tendinous aponeurosis, composed of longitudinal fibres, which are crossed by other thin fibres, covers the internal iliac muscle, and is intimately united with the crural arch; so that crural hernia can only happen on the inner side of the external iliac vein.

Between the external iliac vein, and the spine of the os pubis, there is a small aperture, which is formed by the crest of the os pubis passing obliquely inwards, and by the under and inner portion of the crural arch, which is attached to the spine of the os pubis *.

This aperture is much more considerable in the female than in the male pelvis, not only on account of the difference in the form and length of the bones of the sexes, but also
on

* Vid. plate 3d, letter x, fig. 1st; and tab. 4th, fig. 2d.

on account of the very different shape of the internal part of the crural arch next the pubis *.

A tendinous sheath encloses the external iliac vessels, and other parts ; the fore part of which is formed by the upper and inner portion of the fascia lata of the muscles of the thigh, (which fascia takes its origin from, and is attached to the inner side of the crural arch), and the back part of it is formed by the continuation of the tendinous aponeurosis of the internal iliac muscle, which passes behind the external iliac vessels, and is inserted close to the external edge of the pectineus muscle.

Another portion passes over the pectineus muscle, and is inserted into the ossa pubis.

The external iliac blood-vessels fill up the principal part of the orifice of the sheath : the round ligament of the uterus of the female, or spermatic chord in the male, shuts up a little of the external side, and the epigastric vessels cover its anterior and internal part, on

D iij

their

* Compare fig. 1st of plate 3d ; and fig. 2d of plate 4th

their way to the rectus muscle of the abdomen.

The epigastric artery is commonly sent off from the anterior part of the external iliac artery, before it enters the sheath ; and the circumflex artery from the external and lateral part of the external iliac artery, after it has entered the sheath.

OF THE SITUATION, SIZE, AND FIGURE OF THE CRURAL HERNIA.

IN the crural hernia, the bowels are protruded through an aperture on the inner side of the external iliac vein, which, in fig. 1st of plate 3d, is marked by the letter x.

The crural hernia is less frequent than the inguinal.

It is much more prevalent amongst females than males, because the crural arch of the female is longer and looser than that of the male, owing to the greater width of the female pelvis. Besides, the internal
edge

edge of the crural arch is not nearly so broad next the pubis in the male as in the female ; and hence the crural ring of the female is larger, and the bowels are more readily protruded through it *.

On the other hand, women are less subject to inguinal hernia than men, from the round ligament of the uterus being of smaller size than the spermatic chord, and also from a greater portion of the posterior part of the canal, through which the round ligament of the uterus passes, being supported by the internal edge of the crural arch †.

Crural hernia appears, from the statement of Arnaud, to be more frequent amongst married than unmarried women. He informs us, that of twenty women afflicted with crural hernia, nineteen were married.

In cases of crural hernia, the tumour is less moveable than in scrotal hernia, as it is immediately

* Compare fig. 1st of plate 3d with fig. 2d of plate 4th.

† Figure 2d of Dr Camper's 13th plate illustrates that part of structure in the female.

mediately covered and bound down by the tendinous aponeurosis of the muscles of the thigh; and sometimes also, in consequence of inflammation bringing on adhesion, the tumour is firmly united to the surrounding cellular membrane.

The neck of the tumour, from the pressure of the crural arch, is commonly narrow *.

The body of the tumour is generally of a smaller size than that of a scrotal hernia: it is not exactly round, but a little flattened, from the pressure of the tendinous aponeurosis of the muscles of the thigh.

In some instances, the tumour seems as if it were tilted upwards upon the crural arch: The crookedness of the passage must increase the difficulty of returning the bowels into the cavity of the abdomen, and consequently renders the risk of strangulation much greater than usual.

In the scrotal hernia, the tumour sometimes acquires a great size, as the peritoneum not
being

* Vid. fig. 2d of plate 3d.

being here supported by a tendinous covering, gradually gives way to the weight of the bowels ; one portion dragging another after it, until at last the tumour has been found to contain a large share of the moveable part of the alimentary canal, and to hang down nearly to the patient's knees, notwithstanding which, he often enjoys a tolerable share of health.

From the above description of the situation, size, and coverings of the crural hernia, it is obvious, that a surgeon will find much more difficulty in discovering the nature of this disease, and of ascertaining the contents of the tumour, than in scrotal hernia ; and that the diagnostic in this hernia must be more difficult, as it may readily be mistaken, in its beginning, for an enlargement of one or more of the neighbouring lymphatic glands, or for a collection of matter pushing downwards from a lumbar abscess.

OF THE SITUATION OF THE BLOOD-VESSELS IN
RESPECT TO THE HERNIAL SAC.

FIG. 2d of plate 1st points out the situation of the neighbouring blood-vessels, and spermatic chord, in respect to a scrotal hernia.

It exhibits an inside view of the pelvis of a boy who had been afflicted with a scrotal hernia; and it shows that the epigastric artery passes beneath the spermatic chord and vas deferens, then behind and on the inner side of the hernial sac, in its course to the inner side of the rectus muscle of the abdomen.

The situation of the spermatic chord, vas deferens, and epigastric artery, in respect to the herniary tumour, however correspond with Dr Camper's description and plates, although this is a different view: and, in justice to him, it is necessary to add, that in his *Observat. Anat. Patholog.* (edit. 1762), he had described the epigastric artery as being placed at the inner side of the hernial tumour, in
the

the following passage: “ Arteria cum vena epigastrica simul ac rectum musculum incedit, haec vero pubi, illa ilium ossi proprior est, funiculus spermaticus abdomen egrediens arteriae adjacet: in herniis inguinalibus arteria et vena epigastrica versus pubem a prolapsis intestinis compelluntur.”

Having given such a description of the situation of the epigastric artery, it seems very strange that he should have conceived it not possible to divide the epigastric artery in performing the operation for bubonocoele; for his own plates prove, in the clearest manner, that as the epigastric artery is placed on the inner side of the inguinal hernia, it may be divided, if the surgeon makes a long incision inwards, towards the linea alba.

Mr Rougemont, the translator of Richter's excellent treatise on hernia, states, in the subsequent passage, the sentiments of several very celebrated surgeons, with regard to the situation of the epigastric artery, in respect to the hernial sac, in cases of bubonocoele, and also
their

their methods of performing the operation for the removal of that kind of hernia.

He adds several very pertinent observations, which, to me, seem to merit insertion in this paper *.

Plate

* Les sentimens sont partagés sur la situation de cette artère au côté interne ou au côté externe de l'anneau, ceux qui la croient placée en dehors, recommandent d'inciser l'anneau en dedans, ceux qui la croient placée en dedans, recommandent d'inciser l'anneau au dehors. Mr RICHTER est, comme on voit, du premier sentiment, & dit formellement : *L'artère épigastrique passe ordinairement à l'angle externe & supérieur de l'anneau, & il est évident qu'on s'expose à l'ouvrir, si on incise l'angle externe de l'anneau.* Messieurs CHOPART & DESAULT prescrivent une variation dans la direction de l'incision, ils admettent l'artère épigastrique au côté interne de l'anneau, & rarement au côté externe dans le cas de hernie, de manière qu'ils prescrivent de diriger ordinairement l'incision en haut & en dehors, quand le cordon est derrière & au côté interne du sac; & en haut & en dedans, quand le cordon est au côté externe du sac. Pour accorder ces divers sentimens, il suffit d'examiner un moment la disposition des parties, pour voir que l'opinion de Mrs. CHOPART & DESAULT est fondée sur une autopsie exacte. Le conduit déférent & les vaisseaux spermatiques en traversant l'anneau pour se rendre dans le Tissu cellulaire du péritoine sont placés au côté externe de l'artère épigastrique & comme ces parties suivant une direction oblique de dedans en dehors, il s'en suit qu'en examinant la chose dans un Cadavre où il n'y a point de hernie, on voit réellement l'artère épigastrique plus ou moins près de l'angle externe de l'anneau, ainsi il n'est point surprenant qu'en
incisant

Plate 4th, fig. 1st, exhibits an inside view
of the pelvis of a woman who died in conse-
quence

incisant dans le Cadavre de l'angle interne de l'anneau transversalement vers la ligne blanche, Mr MOHRENHEIM n'ait jamais incisé cette artère, tout cela est vrai quant à l'état naturel des parties, mais si l'on examine la disposition de cette artère dans des sujets qui sont morts avec des hernies, on trouvera ordinairement l'artère épigastrique à l'angle interne de l'anneau, & si on divise alors transversalement de l'angle interne vers la ligne blanche, on coupera sans contredit cette artère. Dans tous les sujets que j'ai disséqués, & qui avoient des hernies inguinales, j'ai toujours trouvé d'après la remarque de Mr DESAULT l'artere épigastrique vers l'angle interne de l'anneau, & je n'ai encore vu qu'une exception : au moment où je rédige cette note, j'ai reçu un Cadavre avec une hernie inguinale au côté gauche, où j'ai fait voir l'artère épigastrique placée au côté interne du commencement du sac : mais dira-t-on, comment cette artère placée ordinairement à l'angle externe de l'anneau peut-elle se trouver dans une hernie inguinale vers l'angle interne, je répondrai que ce changement de position est produit par les viscères, qui s'échappant de dehors en dedans, de haut en bas, poussent le cordon en dedans, & à la partie postérieure de l'ouverture de l'anneau, or comme l'artère épigastrique est placée au côté interne de ces vaisseaux spermatiques, elle est nécessairement déviée plus en dedans : d'ailleurs les hernies inguinales se forment ordinairement par l'angle externe de l'anneau. (Voyez ci-dessus pag. 61.) & le changement de position, dont je parle, a été décrit par l'illustre Mr. CAMPER, qui dit expressément : *Arteria cum venâ epigastricâ simul ad rectum muscolum incedit, hæc vero pubi, illa ilium ossi propior est, funiculus spermaticus abdomen egrediens arteriæ adjacet : in herniis igitur inguinalibus arteria & vena epigastrica versus pubem a prolapsis intestinis compelluntur.* L. c. D'après toutes ces considérations

quence of crural hernia. The epigastric and obturator arteries have a common origin, as marked by letter f.

Plate 5th, fig. 1st, gives an outside view of
the

fidérations j'en conclurai avec Mr DESAULT que l'artère épigastrique dans la hernie inguinale est ordinairement placée près de l'angle interne de l'anneau, & rarement vers l'angle externe. Les cas où cette artère est placée à l'angle externe de l'anneau dans la hernie inguinale sont fort rares, & ils n'arrivent vraisemblablement que lorsque les viscères sortent par la partie interne de l'anneau, & alors le cordon est placée au côté & un peu derrière le sac, j'ai eu occasion il y a deux ans d'observer cette disposition sur un Cadavre, j'ai conservé cette pièce pendant quelques mois, & l'ai montrée à quelques personnes de l'art. Le celebre Mr MICHAELIS rapporte un fait semblable, il s'exprime ainsi dans une lettre à l'illustre Mr RICHTER. " J'ai vu à Londres
" une pièce anatomique, où une hernie inguinale n'étoit point
" placée comme a l'ordinaire au côté externe de l'artère épigastrique, mais au côté interne de cette artère, de manière qu'on
" l'auroit divisée, si on eut dilaté l'anneau en dehors, comme on
" le fait ordinairement. Quand cette disposition sur 200 hernies ne se trouveroit qu'une seule fois, elle seroit toujours un
" fort argument enfaveur du dilatatoire de LE BLANC." V. RICHTER's chirurg. Bibliothek. T. VI. p. 159. Je crois d'après cela qu'il est permis de conclure qu'on court moins de risque de leser l'artere épigastrique en incisant en haut & en dehors, qu'en incisant en haut & en dedans ; que pour reconnoître exactement la disposition de cette artère il faut s'assurer de la position du cordon spermatique relativement au sac, & supposé que cela soit impossible, il faut inciser au milieu du bord supérieur de l'anneau directement en enhaut.)

the body of the same woman, in which the farther course of this artery, and its situation in respect to the herniary sac may be traced, the portion of the abdominal muscles that covered it, having been purposely removed.

The epigastric artery appears about half an inch from the outer side of the neck of the sac, then passing obliquely inwards and upwards to the rectus muscle of the abdomen.

From the preceding plate, it appears, that the surgeon runs little risk of dividing this artery, unless he makes his incision larger, and more outwardly on the neck of the sac, than is proper.

Plate 6th shows the epigastric artery more upon the fore part of the tumour, and its relative situation with respect to the round ligament of the uterus, a portion of the abdominal muscles having been cut out for that purpose.

Upon the whole, the particular situation of this artery with regard to the hernial sac must depend upon the part of the external iliac artery,

artery from which it takes its origin, which will be found to vary a little in different examples. I have seen the epigastric artery sent off from the external iliac artery more than an inch above its exit from the pelvis. I have seen also the epigastric artery and internal circumflex of the pelvis come off from the external iliac artery by a common trunk within the pelvis.

Besides the epigastric artery, there is another artery, which is in danger of being wounded in performing the operation for crural hernia.

I allude to the obturator artery, which though it commonly arises from the internal iliac artery, yet sometimes, as in figure 1st of plate 4th, takes its origin in common with the epigastric artery.

Richter, in his treatise on hernia, observes, that he had met with such a lusus *; and

* Il n'est pas très rare de voir l'artère obturatrice naître avec l'épigastrique par un tronc commun l'artère iliaque. J'ai vu
cette

and Professor Murray, of Upsal, makes a similar remark *.

From the descriptions of these celebrated authors, the reader is led to suppose, that such is by no means an unfrequent *lufus naturae*. It is impossible to determine such a point with mathematical precision: According to my observations, it does not occur in above one of twenty-five or thirty cases.

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cette artère obturatrice dans un cas semblable se porter derrière la partie interne du ligament de Poupart, & se recourber ensuite pour gagner la partie supérieure du trou ovalaire, de manière qu'il peut aisément arriver que les parties en s'échappant par l'angle interne du ligament de Poupart (comme c'est le cas le plus ordinaire) passent derrière cette artère, de sorte que le principe du sac soit environné en devant, en dedans par un Demi-cercle artériel formé par l'obturatrice, en dehors il y a toujours l'artère épigastrique ; ainsi la dilatation dans cette circonstance dans quelque direction qu'on la fasse en dehors, en dedans, en devant est toujours unie au danger de blesser une artère assez considérable, & comme on ne peut reconnoître cette disposition de l'artère obturatrice, & comme elle n'est point infiniment rare, je crois qu'on peut encore considérer cette variété comme une raison, qui doit nous engager à tenter la dilatation.

* Pag. 81. Obturatoria. jam ex iliaca externae ramo epigastrico, deorsum ad pelvim, nonnunquam arteriam ablegante, jam vero et quidem frequentius ex hypogastrica tunico ejusve arteria iliaca posteriore vel ischiadica, vel ileo lumbari pronascitur.

In fig. 1st of plate 4th, the obturator artery, having arisen along with the epigastric artery by a common trunk, passes on the outer side * of the hernial sac of a crural hernia, in its course to the foramen obturatorium. Richter, in a similar lusus naturae, describes the situation of the obturator and epigastric arteries, in respect to the hernial tumour, in these words: “ De sorte que le principe du sac soit environné en devant, en dedans par un demicercle arteriel formé par l’obturatrice, en dehors il y a toujours l’artere epigastrique.”

An intelligent surgeon of this place, Mr Thomson, showed me a drawing of a crural hernia lately, in which the obturator artery, after having arisen, along with the epigastric, by a common trunk, passes on the upper, and then on the inner side of the neck of the hernial sac, and seems as if it surrounded it.

Mr

* By outer side, I mean, on the side next the anterior and superior process of the os innominatum; by inner, that part of the hernial sac next the pubis.

Mr Thomson observed, that he had found such a distribution of the obturator artery to take place in six out of ten preparations he had examined ; and therefore considered this circumstance as forming an insuperable objection to the mode of operating in crural hernia, proposed by Mr Gimbernat.

In fig. 1st of plate 3d, the epigastric and obturator arteries are seen coming off from the external iliac artery at the same place, but not by a common trunk.

I have seen the obturator artery sent off from the external iliac artery about an inch and a half above the epigastric artery.

I have seen another variety of *lusus naturae*, with respect to the origin of the obturator and epigastric arteries : In this variety, the epigastric, obturator, and internal circumflex of the upper part of the thigh were derived from the femoral artery about an inch below the crural arch.

I have stated all the varieties that have fallen under my observation with respect to the

origin and course of the epigastric and obturator arteries, in order to point out to surgeons the possibility, nay probability, of dividing the epigastric or obturator artery in performing the operation for crural hernia.

The epigastric artery has been several times divided in performing that operation; and, in an instance which occurred lately, so great a quantity of blood was lost, and there was so much difficulty in taking up the artery by ligature, in consequence of its retraction, that as the operator (a surgeon of great eminence) emphatically expressed himself, it threatened to pour out the patient's life with her blood.

Even wounds of the smaller branches of the epigastric artery, sometimes prove fatal. Dr Carmichael Smyth has related the histories of two such cases, and makes mention of other similar cases which were communicated to him, in which the patients lost their lives by a wound made in the smaller branches of the epigastric artery, in performing

forming the operation of tapping for dropfy of the belly *.

OF THE SAC OF CRURAL HERNIA.

IT is formed in the same manner as the sac in other instances of hernia, viz. by the peritoneum, which is pushed downwards and forwards before the protruded bowels : but the bowels, in a case of crural hernia, have the additional covering of the tendinous aponeurosis of the muscles of the thigh, which prevents the nature and contents of the tumour from being so readily discovered as in cases of scrotal hernia.

In some instances of crural hernia, two sacs have been discovered.

Instances, in which there are two sacs, in cases of crural herniae, are related by Mr Cal-

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lifen,

* Vid. Lond. Med. Communicat. vol. ii. pag. 484.

lifen *, and Mr Hey †, from whose works I have made extracts.

In the tranfactions already quoted, Mr Cal-lifen has given the hiftories of two fuch cafes (both patients were females, and confiderably advanced in life :) in one of which, the dif-eafe was removed by a chirurgical operation ; in the other, the patient died after an opera-tion had been performed. After enumerating the previous fymptoms of the difeafe, he gives the following account of the fituation of the hernial tumour.

One of thefe tumours was fituated “ *supra ligamentum Fallopii, vero muscoli obliqui aponeurofis in tumorem ovi columbini magnitudinem aequantem extensa erat, qua una cum peritoneo caute incisa intestinum inflammatum ex atro rubescens apparuit.*”

The patient died after the operation ; and, upon inspecting the body after death, he
found

* Vid. Act. Soc. Med. Havniens. vol. ii. page 321.

† Vid. Practical Observations in Surgery.

found that the patient had not died in consequence of the operation, but in consequence of a portion of the intestinal canal being strangulated within another hernial tumour. “*Causam mortis non in hoc loco, nec in notabili inflammatione intestinali inveniens, denique anasam intestini ilei satis magnam, in sacco ab extenso peritonæo singulari modo efformato inclusam detexi, Peritonæum nempe sub ligamento lato sinistro versus superiora ad musculi Psoas tractum saccum formabat, in quo intestini pars gangræna correpta ad angulum acutum reflexa continebatur, quæ reflexio viam intestinalis cavi præcluserat.*”

Mr Hey has given a very full history of a case in which there were two hernial sacs, but which were very differently situated; which I shall also insert.

“ In January 1796, I was desired to visit Mrs Brooke of Harewood, whom I had some years ago cured of a strangulated femoral hernia by the operation, and who now laboured under the same disease on the opposite side.

The

The strangulation had subsisted three days. She vomited frequently, and had had no stool; yet the abdomen was soft, her pulse calm, and her tongue clean.

“ I immediately performed the operation. There was nothing in the hernial sac but omentum, except a large quantity of ferous fluid. The omentum was in part gangrened, and adhered to the sac. I could find no aperture into the abdomen. My patient seemed convinced that the intestine had been down before I began to perform the operation; and from the accurate description which she gave me of the different states of her disease, I saw no reason to doubt the truth of her conjecture. She assured me that, during the operation, she had the sensation which she was accustomed to feel whenever the intestine retired into the abdomen. The hernial sac was much wrinkled, as if, after being distended, it had fallen into a collapsed state. I cut off all that part of the omentum which appeared diseased, as well as all that projected from the hernial
sac.

fac. That part which appeared found, and adhered closely to the sac, I suffered to remain, lest I should wound the sac ; for its irregular wrinkled surface made the excision difficult.

“ The patient recovered very well, but the hernia returned, and a truss was applied to prevent the intestine from descending as usual.

“ In this case, it seems to me highly probable, that the interior surface of the omental sac became the exterior surface of the intestinal one. Had not the intestine retired while I was dividing the hernial sac, I should have found a double hernia, one omental, and the other intestinal.”

These are very important cases, and serve to point out to surgeons the necessity of a minute examination into the nature of the disease, and of the symptoms which follow the operation for the removal of hernia.

OF THE CONTENTS OF THE SAC OF THE
CRURAL HERNIA.

THE contents of the crural hernia do not essentially differ from those of other herniae; and, therefore, what has been stated with regard to the contents of hernia in general applies also to this form of disease.

In instances of crural hernia, a small portion of the ileum is most frequently found within the tumour; sometimes only one part of intestine has been constricted.

But the omentum has not been so often discovered within such tumours as in umbilical or scrotal herniae; these have been sometimes found to contain omentum alone.

What has been said as to the consequences of strangulation in other herniae applies also to crural hernia.

In cases of crural hernia, the bowels are less readily reduced than in other species of this disease, on account of the narrowness of the neck of the sac, as is seen in fig. 2d of tab. 3d, and

and in plate 6th ; and also on account of the crooked direction of the tumour with respect to the abdomen, as already stated : and hence also they are more frequently strangulated, especially as the crural hernia happens suddenly, and most frequently occurs after violent muscular exertion.

Fig. 2d of plate 5th shows the effect of inflammation upon a portion of the ileum which was contained within the sac of a crural hernia.

Upon making an incision into the intestine, with a view to ascertain the change which inflammation had produced, its coats were found considerably thickened, with a layer of coagulable lymph, nearly one fourth of an inch thick, effused on the inside of the protruded bowel ; and, at one part, the stricture was so complete, that even a small probe could not be passed through it.

The outer portion of the protruded intestine adhered, by a layer of coagulable lymph, to the sac which contained it.

DIAGNOSIS OF CRURAL HERNIA.

ON account of the very small size of the tumour, it is often very difficult, by an examination of it, by pressure with the fingers, to discover the nature of its contents, as may generally be done in cases of scrotal or umbilical herniae, especially as the tumour, in cases of crural hernia, has an additional tense covering from the tendinous aponeurosis of the muscles of the thigh; besides which, in many instances, one or more of the inguinal lymphatic glands are situated at the side of or over the herniary sac.

The general or sympathetic symptoms of all kinds of herniae are nearly the same; and hence it is only necessary to examine with attention the symptoms of such local diseases as may counterfeit a crural hernia.

As a crural hernia may be very readily mistaken for a swelling of the inguinal lymphatic glands,

glands, or for the under part of a lumbar abscess, it becomes more necessary to detail also the symptoms of such cases.

The lymphatic glands of the groin are often swollen in consequence of lues venerea, scrofula, and cancer.

Hernia may be distinguished from a venereal bubo by attending to the peculiar feeling of the tumour, the progress of the tumour towards suppuration, and the general symptoms.

The bowels are not affected by a venereal bubo, as by hernia; in the former, the tumour is hard, often knotty; cannot, by pressure, be made to disappear, or to become less; and is generally situated in the uppermost cluster of inguinal lymphatic glands.

Notwithstanding these and other marks of distinction, surgeons of the greatest eminence have sometimes mistaken hernia for a venereal bubo, or a venereal bubo for a hernia.

Sabatier acknowledges that he mistook a venereal bubo for a crural hernia *.

Mr Elfe † met with a singular case of crural hernia, in which the hernial tumour was placed behind a swelled lymphatic gland of the groin; which complication of disease might very readily have deceived a surgeon.

The subject of this case had been a physician's patient, in St Thomas's Hospital, on account of rheumatic pains, but which his physician concluded to be venereal. He had gone out in a coach, and said, that, from the jolting of the coach, a swelling had come on in his groin. Mr Elfe directed a poultice to be applied to the tumour.

The person died in three days, with all the symptoms of strangulated intestine. Mr Elfe
opened

* Sans doute, qu'on a pris aussi, quelquefois des bubons veneriens pour des hernies. Cette méprise m'est arrivée une fois, et je ne crains pas de l'avouer, afin d'attirer sur ce point l'attention des personnes à qui cet ouvrage est destiné.

Vid. De la Med. Oper. tom. i. pag. 147.

† Vid. Lond. Med. Obs. & Inq. vol iv. page 355.

opened the body, and gives the subsequent account of the dissection.

“ I procured leave to open the body, and, raising the integuments, laid bare the lymphatic gland which I had felt, which was much enlarged and inflamed. I then dissected Poupart's ligament very clean ; and though I raised up the edge of the gland all round with my finger, I could discover no appearance of a hernial sac. I then cut into the substance of the gland, without being able to see any thing like a rupture. After this, I made an opening into the cavity of the abdomen, and presently saw that a very small portion of the ileum had descended, and was strangulated. The intestine above the strangulated part was livid, where I made an incision into it, and found that I could pass a blow-pipe, or my finger, along the intestinal canal beyond the strangulated part, and without interruption from it. On dissecting away the lymphatic gland, I saw that a small portion of the intestinal tube, about the size of a hazle-nut, had descended.”

A quantity of fat, or a collection of hydatids, on the inner side of the groin, may resemble a herniary tumour in some degree.

Of the latter form of disease, an excellent specimen is preserved in my father's museum, in which a sac, the size of an egg, which contained within it a quantity of hydatids, was removed from the upper and inner portion of the thigh, which might readily be mistaken for a hernia, as the hydatids contain a watery fluid, have thin and elastic coats, which communicate to the sense of touch nearly the same kind of sensations as a protruded portion of intestine, and are contained within a sac very similar to a hernial sac

Another case, somewhat similar, is described, in Default's Chirurgical Journal, by Mr Manoury, in which a large hydatid lay over the place where the bowels protrude in cases of inguinal hernia: It had been mistaken by a surgeon for a hernia *.

Lumbar

* Vid. 252, tom. i. The history of the symptoms of this case, and the mode of distinguishing this complaint from hernia,

Lumbar abscess may be very readily mistaken for a crural hernia, especially as the purulent matter does not always follow the course of the psoas muscle.

The lumbar abscess is distinguished from hernia by the previous symptoms of inflammation in the side, resembling the symptoms
of

is given in the following passage :—“ Pressant légèrement cette tumeur entre les doigts, il y sentit de la fluctuation : ce signe étoit encore équivoque ; il a aussi lieu dans les hernies dont le sac contient beaucoup de sérosité : mais une lumière, placée au côté opposé à celui où l'on regardoit cette tumeur, la rendoit transparente dans toute son étendue, et si on la déprimoit avec la main, en la tirant en bas, elle s'éloignoit de l'anneau et laissoit entre elle et cette partie un vide où l'on pouvoit enfoncer le bout du doigt et reconnoître qu'elle n'étoit formée par aucun prolongement de la cavité du bas-ventre.”

An operation was performed by Default, who made an opening into the hydatid, and found, in the anterior and upper part of the sac, a small tumour, “ à l'endroit répondant à l'anneau inguinal, une tumeur approchant du volume de la moitié d'une grosse noix ; elle disparoissoit lorsque la malade cessoit de crier, étoit de couleur grisâtre, et rentroit par une légère compression : on ne douta pas qu'elle ne fût formée par le péritoine poussé avec les intestins à travers l'anneau, dans les efforts et les contractions de cet enfant. Cette disposition donne l'explication d'un signe que présentait cette tumeur, et qui étoit des plus propres à jeter des doutes sur sa nature et à induire en erreur, savoir son augmentation quand la malade touffoit,” etc.

of nephralgia calculosa, or nephritis ; by pain increased on motion : by the slow and gradual increase of the tumour, and other symptoms ; by the fluctuation of the matter, felt on alternate pressure being made on the loins, and upper and inner part of the thigh ; by examining the tumour in the alternate state of the erect and horizontal posture ; and by the absence of such symptoms as denote an obstruction in the bowels.

A crural hernia may be mistaken for an inguinal hernia.

From what has been already advanced, it is obvious, that the sex of the patient will assist us in distinguishing one kind of hernia from another ; women being so much more frequently afflicted with crural hernia than men.

The late Professor Hamilton, of Glasgow *, seems to have thought, that one variety of hernia is very often mistaken by surgeons for another, and gives the subsequent catalogue of
of

* Vid. Edinb. Phil. Transf. vol. 4th.

of symptoms, by which an inguinal hernia may be distinguished from a crural hernia.

“ The appearances of the bubonocèle, when small, will deceive a practitioner, if he is not on his guard, and make him imagine it a femoral rupture. The marks by which the one may be distinguished from the other, though situated in the same place, are few and simple.

“ As the fascia of the thigh joins Poupert’s ligament, the femoral hernia is always under the fascia ; it is therefore more compressed ; it is not loose ; and we cannot so well grasp it with the hand ; and, instead of being rounded on the top, it is more or less flattened.

“ The bubonocèle, again, is only under the skin and cellular membrane ; is therefore looser ; can be grasped ; and is rounded on the top.

“ In femoral hernia, the swelling begins at the edge of Poupert’s ligament, and goes down, and we feel the ring, and the parts above the ligament, uncovered by the hernia. In the

bubonocoele of women, it goes over Poupart's ligament, and sometimes up upon the muscles over the ring, and extends more to each side, along the bending of the thigh, than the other."

PROGNOSIS IN CASES OF CRURAL HERNIA.

THE prognosis, in cases of crural hernia, is much less favourable than in other varieties of hernia, as, in such cases, it is generally much more difficult to return the intestines into the cavity of the abdomen, than in the scrotal or umbilical hernia, on account of the narrowness of the neck of the sac, and from the sac in crural herniae being sometimes tilted upwards on the crural arch; thereby rendering the passage between the cavity of the herniary sac, and cavity of the abdomen, very indirect.

Besides, on account of the straitness of the passage through which the intestines are protruded,

truded, a very small part of the intestine only is commonly displaced, which is thereby in greater danger of being strangulated, than when the omentum also is contained within the herniary sac.

I shall conclude this paper, by making a few observations, which may be regarded as corollaries or inductions from the preceding facts.

As the neck of a crural hernia is generally much narrower than that of a bubonocoele, there is much greater risk of inflammation affecting the bowels contained within the herniary tumour in the former, than in the latter case ; and there will be much greater difficulty, and therefore less chance of returning the bowels into the cavity of the abdomen, in a case of crural, than in a case of inguinal hernia.

In the case of a strangulated hernia, it is extremely difficult to name the moment when

the operation should be performed, and when it may prove a cure.

Dr Baillie very justly observes, that the pulse is by no means an infallible index of the state of the protruded intestine. “ The pulse is sometimes, in such a case, not increased in frequency beyond the standard of health, and yet the inflammation of the bowel has been discovered afterwards, by the operation, to be very great. This is an important practical observation, because it shows that the degree of inflammation is not to be judged of from the pulse, and teaches, that the operation should not be delayed, after the proper efforts for reducing the rupture have failed, because the pulse may happen to be little, or not at all, accelerated.”

Nor can we judge with certainty, from the state of the other symptoms, whether the operation will be the means of cure, as these are very various, in point of severity, in different constitutions.

In most cases, mortification of the bowels
comes

comes on in one, two, or three days after the strangulation; but there are a few instances upon record, in which the operation has been performed with success after four, nay, after five or six days from the period of the strangulation.

In general, the difficulty and hazard of performing the operation for crural hernia deter the surgeon from having recourse to his operation in due season. In most instances, that important operation ought to be performed soon after the other means of reducing the herniary tumour have been found inefficacious, as the bowels, without much previous pain or inflammation, are often reduced to a state which proves fatal to the patient, by terminating in mortification.

From the annexed plates, we learn, that if the operation be postponed until a considerable degree of inflammation has affected the herniary sac, it will often be impracticable to reduce the bowels, as an effusion of coagulable lymph, which forms a bond of union between
the

the herniary sac and bowels contained within it, very soon succeeds the inflammation; or, if the attack of the inflammation be violent, especially in crural hernia, it is very apt to terminate in mortification.

From the above description of the structure of the crural arch, and from the preceding account of the situation of the crural hernia, it appears, that Mr Gimbernat's mode of performing the operation for that complaint is not only the safest, but also the most certain method of taking off the stricture upon the bowels: Hence I shall subjoin his description of his mode of operating, and shall make a few comments upon it.

“ The patient being placed, as in the operation for inguinal hernia, and the hernial sac being laid open, an attempt should be made, if the intestine be uninjured, to replace it by the hand.

“ For this purpose introduce, along the internal side of the intestines, a canulated or
grooved

grooved found, with a blunt end, and a channel of sufficient depth.

“ This is to be directed obliquely inwards, till it enter the crural ring; which will be known by the increased resistance, as also when its point rests upon the branch of the os pubis. Then suspend the introduction, and keeping the found (with your left hand, if you are operating on the right side) firmly resting upon the branch of the os pubis, so that its back shall be turned towards the intestine, and its canal to the symphysis pubis.

“ Introduce gently with your other hand, into the groove of the found, a bistoury with a narrow blade and blunt end, till it enters the ring; its entry will be known, as before, by a little increase of resistance. Cautiously press the bistoury to the end of the canal, and, employing your two hands at once, carry both instruments close along the branch to the body of the pubis, drawing them out at the same time.

“ By

“ By this easy operation, you will divide the internal edge of the crural arch at its extremity, and, within four or five lines of its duplicature, the remainder continuing firmly attached by the inferior band, or pillar, of which it is the continuation.

“ This simple incision being thus made, without the smallest danger, the internal border of the arch, which forms the strangulation, will be considerably relaxed, and the parts will be reduced with the greatest ease.”

How far the advice given in the first paragraph of this extract, viz. laying open the sac, should be followed, admits of doubt.

My father, in his treatise upon the burſae mucoſae, has publiſhed the hiſtories of four caſes, in which the bowels were returned into the cavity of the abdomen, without opening the ſac, and, in all of theſe, the patients ſoon got well *; and I know of another inſtance
in

* Vid. Appendix.

in which the same method of operating was adopted, and with the same good success. It seems singular that Mr Gimbernat should have recommended the opening the sac, before the tendinous substance is divided, as he seems, from a succeeding passage, to have been fully aware of the bad effect of exposing the intestines to the air: His words are, " This compress should extend two inches beyond the future, to prevent the introduction of the air, or of any body capable of occasioning irritation."

If the operation were performed as soon as it ought to be, after the other means of reducing the hernia have been found inefficacious, the contents of the hernial tumour generally may be reduced, without opening the sac.

Various arguments, which, at first sight, appear plausible, have been employed by those who recommend the laying open the hernial sac in all cases; but, if the reader will consult the Appendix to this paper, which contains

contains my father's arguments against this practice, he may probably be convinced, that the doing so, is not only unnecessary, but highly dangerous, except in very particular cases, where the neck of the sac is unusually constricted.

Mr Gimbernath affirms, that the bladder of urine, when distended by urine, or the uterus by its contents, may be injured in his mode of operating; but if the bladder be emptied, the smaller intestines will slip downwards into the place the distended bladder of urine pre-occupied, and hence may be injured.

I have subjoined an account of the mode of operating in cases of crural hernia, which has always been recommended and shown by my father, in his surgical lectures.

“ In the femoral hernia, the external incision is to be made obliquely, from within, outwards and downwards, beginning the incision an inch or so above the tendon called ligament

ment of Fallopius, and continuing it to the like distance below the ligament.

“ We are next to make a small hole, immediately below the ligament in the tendinous aponeurosis, which covers the muscles on the inner side of the thigh, and is connected to the ligament.

“ We are then to introduce the point of a small furrowed probe or directory under the ligament; and holding this in the oblique direction upwards, towards the umbilicus, we are cautiously and slowly to divide, with the straight probe pointed knife, one little bundle of the tendinous fibres after another, using the knife as a saw, instead of entering its point deep within the tendon, and then raising its handle, so as to make a large sweep or extensive incision with the edge of the knife.

“ I advise the edge of the knife to be turned towards the umbilicus; because, if it be turned inwards, towards the ring of the external oblique muscle, as Le Dran directs, it will very readily cut the spermatic chord, or round ligament

ment of the uterus ; and, if it is turned outwards, as Mr Sharp advises, it may readily cut the epigastric artery ; but when we turn it towards the umbilicus, it will be directed to the place at which the spermatic chord and epigastric artery cross each other, like the strokes of the letter x, and of course will be at the greatest possible distance from both.

“ If, besides giving the knife this direction, we slowly and cautiously divide the tendinous ligament, dilating the opening gradually by introducing the finger, I know, not only from the situation of parts in the sound body, but from a considerable number of cases, in which I have assisted in the operation, that the tendinous ligament may be completely divided without cutting the spermatic chord, or epigastric artery.”

Both methods of operating have been successfully performed : In the former, there is less risk of wounding the epigastric artery, in those instances in which there is the usual distribution of arteries ; and it is evident, that
that

that method of operating might be performed with still greater safety, if the surgeon, instead of carrying both instruments close along the branch of the body of the os pubis, and drawing them out at the same time, as Mr Gimbernat directs, divided one part after another with great caution. By following that method, he might even avoid dividing the obturator artery when it arises in common with the epigastric artery, and runs along the upper and inner side of the hernial sac; but as such is by no means a frequent *lusus naturae*, the operation of Gimbernat should not, on that account solely, be laid aside.

As an additional argument in favour of Mr Gimbernat's method of operating, I may add, that it is not essentially different from that recommended and practised by Mr Hey of Leeds.

Future experience must determine to which of these methods of performing the operation for crural hernia the preference is due.

A P P E N D I X.

EXTRACT *from Dr MONRO's Description of all
the Surfae Mucosae of the human Body.*

WITH similar views I have long ventured to propose a method of operating in hernia, which I am persuaded, from a most successful trial of it in different cases, as well as from reason and analogy, would render this frequent and very necessary operation far less dangerous than it has hitherto proved in the hands of the most experienced and dexterous surgeons. And as this is a subject of the utmost importance, I shall state it more fully than is perhaps necessary for illustrating the chief subject of this work.

That I may give a fair representation of the opinion and practice of the present most eminent surgeons, I shall quote the following passages from the works of one of the latest and most justly celebrated authors in surgery, I mean Mr Pott *.

In the first place, he tells us (p. 286.) “ These are my

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“ principal

* Pott's Works in 4to, 1775.

“ principal reasons for believing that the mere stricture
 “ made by the tendon is, in the generality of incarcerated
 “ ruptures, not only a sufficient, but the primary and in-
 “ deed the sole cause of the symptoms, and of all the mis-
 “ chief.”

When, after bleeding, glysters, &c. pressure, posture, and agitation of the patient's body are found to be insufficient for the reduction of the bowels, recourse is had to the operation; which is directed to be done in the following manner: “ An incision must be made through the skin
 “ and membrana adiposa, beginning just above the place
 “ where the intestine passes out from the belly, and
 “ continuing it quite down to the lower part of the scro-
 “ tum—The place to make the incision in the hernial sac
 “ is about an inch and a half below the stricture, and the
 “ opening need not be larger than to admit the end of the
 “ operator's finger—With the knife on the finger the sac
 “ must be divided quite up to the opening in the tendon,
 “ and down to the bottom of the scrotum—The sac being
 “ laid open, the intestine generally pushes out immediate-
 “ ly—This is the time to try whether, by gently drawing
 “ out a little more of the gut, its bulk cannot be so re-
 “ duced, as to enable the surgeon to return it back into
 “ the belly without dividing the tendon—Yet if it (the
 “ reduction) cannot be very easily accomplished without
 “ the division of the tendon, it had better not be attempt-
 “ ed—The sac and stricture being divided, the contained
 “ parts

“ parts come into view—In returning the intestine, care
 “ should be taken to put in that part first which came out
 “ last, &c. A considerable part of the hernial sac, if large,
 “ thick, and hard, may very safely and properly be re-
 “ moved—An old rupture which was originally congenial
 “ is subject to a stricture made by the sac itself, indepen-
 “ dent of the abdominal tendon, as well as to that made
 “ by the said tendon. And in this kind of hernia I have
 “ more frequently found adhesions of the parts with each
 “ other, of the intestine with the testicle *.” Stitching
 up the wound is not directed to be done by Mr Pott ; and
 some late writers tell us it ought never to be attempted.

After observing the steps directed to be taken in the operation, let us consider the degree of danger which attends the operation, and the chief cause or causes of that danger ; by which we shall be led to the way of avoiding them.

It is not only true that a great proportion, in general, of those on whom the operation for hernia has been performed, dies ; but it must be acknowledged, that many die on whom the operation has been done early, before symptoms of violent inflammation bordering on mortification have appeared. Nay, Mr Sharp tells us, “ That he has
 “ seen two or three patients, who were in every respect
 “ hale and strong, and who submitted to the operation
 “ merely to get rid of an inconvenience, die a few days

G ij

“ after

* See Mr Pott's Works in 4to, 1775, pages 286, 278, 279, 280, 289, 290, 312.

“after the operation ;” and adds, “ that the event, though very surprizing, should be a lesson never to commend this method of treating an epiplocele, unless it is attended with inflammation,” &c. * The same thing has occurred to other eminent surgeons †: To which the reader will please to add what was before observed, that if wounds be made into the abdomen of sound animals, and that a portion of the alimentary canal, as large as that which is often contained in a herniary sac, be handled and exposed to the air, the animals frequently die.

That the wound of the tendon or peritonæum contributes little or nothing to the fatal event, appears clearly from the following circumstances.

In the first place, I might with great propriety quote the numerous experiments of Dr Haller and others, who have found that tendons may be wounded without pain or material bad consequences. But without dwelling on these experiments, I have in several cases directed the aponeurosis of the human temporal muscle to be cut largely in fractures of the cranium ; I have directed an incision to be made in the aponeurosis of the biceps flexor cubiti, for the discharge of fetid matter confined by it ; I have seen it repeatedly divided in the operation for aneurism ; I have in many living animals cut the linea alba and the peritonæum freely ; I have in two cases of bubonocèle cut free-

ly

* See Sharp Op. of Surg. 1761, p. 28.

† J. L. Petit Tr. des Mal. Chir. 1774, T. 2. p. 354. &c.

ly the tendon of the ring of the external oblique ; and in two cases of crural hernia, divided with like freedom the tendon of the external oblique, called Ligament of Fallopius. In two of these cases, the peritonæum, which was thickened, and formed a stricture at the neck of the sac, was divided ; yet all these incisions were performed without producing any dangerous consequences. In like manner, I have seen the vaginal coat of the testicle laid open by incision ; but the dressings having slipped from between the lips of the incision, these grew together without producing such a degree of inflammation as seemed necessary to effectuate a cure, so that there was a necessity of tearing them asunder to introduce dressings and to admit the air.

We may therefore conclude, without a doubt, that the danger of the operation of hernia is not owing to the mere division of the tendon or of the peritonæum ; but that it depends chiefly, and almost solely, on the handling of the bowels, and the exposure of these and of the inner side of the sac to the air : Nay, in some cases where the operation of the hernia had proved fatal, I observed, in opening the abdomen, that portions of the intestine, and likewise of the peritonæum, at a distance from the herniary sac, were much inflamed, although the patient had not before the operation complained of pain, except at the place of the rupture.

When we now review the opinion and the practice of surgeons, we shall perhaps find they are not a little inconsistent with each other : for “ if the mere stricture made by

“ the tendon is, in the generality of incarcerated ruptures,
 “ not only a sufficient, but the primary and indeed the
 “ sole cause of the symptoms, and of all the mischief,”
 why, after the skin is divided, do surgeons first lay open
 the herniary sac its whole length, and then cut the tendon;
 instead of merely cutting the stricture made by the tendon,
 without opening the sac, and then reducing the bowels by
 pressure, posture, and agitation, if the latter should ever
 be necessary ?

They pretend indeed to assign as reasons for their practice, that unless the sac is laid open, we cannot know in what state the bowels are ; that the intestines or omentum are liable to mortification ; that collections of fetid water are apt to occur, which, on being pushed back into the abdomen, might be productive of mischief ; that sometimes the cause of strangulation has been detected either in the entrance to the sac or among the bowels protruded ; or they tell us there are adhesions of the bowels to the inner side of the sac, which ought to be separated.

But such kind of reasoning, if it has weight, goes farther than is intended ; for it ought to prevent surgeons from attempting in any case, at least from attempting in most cases, the reduction of a hernia.

Yet nothing is more common than to see surgeons doing every thing in their power to reduce a hernia ; and in a few minutes or hours thereafter, instead of taking off the stricture by cutting the tendon, laying open the herniary sac, as if the reduction of the bowels would otherwise have

been

been unsafe. Surely no reason can be given why the reduction of the bowels should be safe before the tendon is cut, but unsafe after it is cut.

But instead of using this kind of *argumentum ad hominem*, as it is called, I would observe farther, that it so very seldom happens that one part of the intestine is twisted around another, or the omentum around the intestine, so as to strangle it, that we find only a very few such cases mentioned in the whole history of surgery. And if even we were to suppose such a case of twisting or volvulus, if the hernia had not continued so long as to produce an accretion of the bowels, the effect of the twisting and pressure would probably be taken off by pushing the bowels back into their natural place in the large cavity of the abdomen. As for the fetid water, which it is said is apt to occur, and that the pushing it back into the abdomen might be productive of mischief; from what I have observed in the operation of hernia, I am very doubtful whether fetid water is ever produced except where there is mortification. Water is indeed often effused in a strangulated hernia; but if there is no mortification, and the hernia be reduced, that water produces no bad symptom, but is soon absorbed. If this was not the case, the reduction of every hernia which had been for a short time strangulated would be attended with danger.

We are by this observation led to consider the treatment in mortification.

If it be certain that the bowels are mortified, the necessity of opening the sac is evident, that we may give our patient a chance of life, though to be attended with most uncomfortable circumstances : But if there be the smallest chance that the inflammation may terminate without mortification, it is equally certain that nothing can be so pernicious as opening the sac, and that the bowels ought to be returned without exposing them to the air.

To make this more evident, I shall suppose that the bowels cannot be reduced by taxis, or that the operation is necessary in two hundred patients ; and that in one fourth part of the number, the bowels are so much strangulated and inflamed, that the termination in a mortification could not by any means be prevented, but that in the other three fourths there is a probable chance that the inflammation may be dispersed.

If the operation be done in all these cases by opening the sac, it is probable that of the first fifty we may save one or two in all ; and of the other hundred and fifty, thirty or forty at the utmost. Whereas, if we suppose that in all these patients the skin and tendon only are divided, and the bowels reduced without opening the sac, we should indeed lose all those in whom the mortification was complete : but I am well convinced we should not lose above ten or twenty at most of the other hundred and fifty ; and that upon the whole many more lives would be saved,

After

After having reasoned in this manner upon the subject for several years, I determined to put this method of operating to the trial, and have accordingly directed it to be practised in four cases: in all of which the patient seemed to be in great danger, and yet every one of them recovered, without a single bad symptom in consequence of the operation.

In 1770 I was called, along with Mr Alexander Wood, to a case of crural hernia in a woman thirty-five years of age, with symptoms of strangulation, which had continued three days. Finding it impossible to reduce it, I prevailed with Mr Wood to cut the tendon, without opening the sac, and then to attempt the reduction; which we executed with the utmost ease.

In 1774, in a case of hernia congenita, to which I was called by Mr Clarkson, surgeon at Dalkeith, we found the neck of the sac, as well as the tendon of the oblique muscle, extremely constricted. After cutting the skin and tendon, we, with much difficulty, divided the stricture at the neck of the sac; and, having reduced the bowels, we stitched the teguments.

In the end of 1781, I was called by Mr Arrot, surgeon in Edinburgh, to a gentleman considerably above sixty years of age, who had been long subject to a large hernia, which had been strangulated for several days. All the common means of cure having proved ineffectual, I proposed

posed the incision of the tendon, which was very easily executed; and, after that, all the bowels were readily returned into the abdomen, except a portion which seemed to grow firmly to the inner side of the sac. All the bad symptoms disappeared; and the incision, the sides of which were supported by stitches, closed like a common wound of the teguments.

In 1782, I was called by Mr Simpson and Mr Calderwood, surgeons in Dalkeith, to a case of crural hernia, which had been strangulated more than two days, in a woman thirty-five years of age. I directed the tendon to be cut; but still finding resistance from a straitness and thickening of the neck of the sac, we made a small perforation in the peritonæum above the stricture, and introducing a probe bent semicircularly at its point, cut the neck of the sac upon it. We then easily reduced a small portion of the ileum which was strangulated, and stitched the wound accurately. Six days thereafter, I received from Mr Calderwood the following letter.

“ Sir,

“ I have the pleasure to inform you, that our patient at Dalhousie promises a favourable recovery. She has had regular and free passage twice a-day. The pain in her belly is quite gone. She has had hardly any degree of fever, and the wound discharges good matter. I am
convinced

convinced the stitching, beside lessening the danger, will contribute very much to a speedy recovery.

I am, &c.

R. CALDERWOOD."

Dalkeith, Nov. 8. 1782.

This patient, and, so far as I know, all the others, are still alive and well.

We are told, in the last place, that the sac ought to be laid open, in order that the surgeon may separate any adhesions the bowels may have contracted.

For my own part, I am much inclined to believe, that, in the case of adhesion, the safest and best general rule will be, to take off the stricture by cutting the tendon, without exposing the patient to the imminent danger of opening the sac, to be heightened by the time which must be necessary for the separation of the adhesions.

But if, instead of this, the reader shall, upon the authority of Mr Pott, judge it advisable in all cases to attempt the separation of adhering parts *, it will surely be time enough to open the sac, after we have taken off the stricture by cutting the tendon, and found that the bowels cannot be reduced by pressure, because they adhere to the inner side of the sac.

The

* Mr Pott, p. 291. says, "I have seen the intestines very firmly adherent to each other, to the sac, to the omentum, and to the testicle; but never in such a state of adhesion as to be incapable of being returned."

The rule of opening the sac, after dividing the skin, seems to have been introduced, because surgeons supposed the mere incision of the tendinous parts constituted a principal part of the danger of the operation; and that they were by no means aware that the danger proceeded chiefly and almost entirely from the exposure of the bowels to the air: And this practice has of late been transmitted from one author to another, from a want of due attention and reflection *.

Upon

* The ingenious M. J. L. Petit proposed, many years ago, to avoid opening the sac in the operation for certain cases in strangulated hernia, as appears by a posthumous work of his, printed at Paris in 1774, in three volumes, *De Malad. Chirurg.* It has been reported that he afterwards relinquished this method, and “joined keenly with those who had opposed it;” but I find no proof of this in his posthumous work. But if we attend to his reasoning upon it in tom. ii. p. 356, where he lays down the following proposition, which not only appears at first sight paradoxical, but which cannot be founded on proper facts, and leads him, in p. 359, to a most dangerous and false conclusion, “*Qu’il est bon, pour reussir, que les parties aient été quelque tems à la gene,*” to wit, “*Que ces operations faites aux hernies sans etrangement, n’ont pas des suites si heureuses, que celles, qui sont faites aux hernies qui sont etranglées;*” we will readily perceive, that Mr Petit did not perceive the chief advantages of the operation he proposed; I mean, that the danger in the common method of operating arises chiefly from the exposure of the bowels to the air; and as this material fact has been little better understood by various authors who have lately wrote on the subject, that method has been rejected by them on as slight foundation as that on which it was proposed by Mr Petit.

Upon the whole, I have no doubt that many lives may be saved by adopting the following rules in the operation for hernia.

If the surgeon is not called till the bowels are evidently in a state of mortification, the method recommended by authors is to be followed.

But if he is called in proper time, after trying in vain the ordinary method of reducing the bowels, he ought to operate more early than is commonly done, or before the inflammation can have produced adhesion; in which case the operation, after dividing the skin, should consist merely in the taking off the stricture by cutting the tendon. In this case, after the skin opposite to the ring is cut, the stricture is to be taken off by dividing the tendon; after which the bowels may, by gentle pressure, be returned into the abdomen, without any danger of their suffering by being twisted; and the inflammation which follows the division of the tendon, especially if the sides of the incision in the skin be joined by stitches, will scarcely be greater than where the skin alone is divided.

By the by, I would here observe, that the division of the tendon in the crural hernia is not attended with that degree of danger which some of the latest and most eminent writers have supposed*, providing the edge of the knife be turned towards the umbilicus; in which direction, both the epigastric artery and spermatic cord are at
the

* Pott, p. 308.

the greatest distance from it ; and that the knife be used like a saw, dividing cautiously with it one tendinous fasciculus after another.

If, after dividing the tendon, the bowels cannot easily be returned into the abdomen, there may be room for suspecting that they are confined by a stricture of the neck of the sac, especially in the hernia congenita ; which must therefore be in the next place removed.

If the herniary sac under the straitened place of its neck be thin and transparent, and that there is little or no reason to suspect an adhesion of the bowels with the sac, the best method will be to make a small hole in the sac below the stricture, and then to introduce a small furrowed probe, and to cut cautiously upon it : But if the sac be thick and dark coloured, and that there is likewise a suspicion that the bowels may adhere to it, the easiest and safest manner will be to make the hole in the peritonæum above the stricture ; then to introduce a common probe, bent near its point into a semicircle ; and to introduce this, with its point directed downwards, through the stricture into the sac ; and, upon the point of it, to make, with great caution, another small hole ; after which we may either cut upon the probe, or introduce a furrowed probe, and divide the neck of the sac *.

After

* In a case of crural hernia to which I was called along with Mr Dewar surgeon, in 1772, the sac was thick and opake, with

After this the bowels are to be returned by pressure upon the sac, without opening it farther ; and the wound in the skin is to be stitched so accurately, by passing the stitches about the breadth of the finger from each other, as to prevent the access of the air. The wound in the skin ought likewise to be dressed with large pieces of lint spread with simple cerate, and these should be covered with a compress.

In the hernia congenita, where the bowels are in the same sac with the testicle, it is still more necessary than in the most common kind of hernia to avoid opening the herniary sac, as the inflammation of the testicle would add considerably to the danger.

In the case of hernia congenita, which I treated along with Mr Clarkfon in 1774, the testicle, which, before the operation, had been in a great measure concealed by the bowels descending to the bottom of the scrotum, was not so much inflamed during the cure as to be sensibly enlarged.

Before I conclude, I cannot help taking notice of a want of accuracy, in the late writers, as to the manner of distinguishing the hernia congenita. Mr Pott, p. 311, says,
 “ The

with a suspicion of adhesion; for which I proposed this method; and we executed it with little difficulty. It was likewise easily done in the operation I attended in 1782 with Mr Simpson and Mr Calderwood, and very lately in a case I attended with Dr Alexander Hamilton and Mr Andrew Wood surgeon.

“ The appearance of a hernia, in very early infancy, will always make it probable, that it is of this kind ; but, in an adult, there is no reason for supposing his rupture to be of this sort, but his having been afflicted with it from his infancy. There is no external mark or character, whereby it can be certainly distinguished from one contained in a common hernial sac ; neither would it be of any material use in practice, if there was.”

Instead of which, I would observe, 1. That a hernia that is not congenite may have continued from early infancy. 2. That a congenite hernia may be distinguished in an adult by an evident external mark ; which is, that the bowels push down between the sac and the fore part and sides of the testicle, so as often, in a great measure, to conceal it ; whereas, in the common hernia, every part of the testicle can be felt distinctly. 3. I would allege, that it is of material use to make the distinction ; because, in whatever manner we operate in the hernia congenita, unless we take the utmost care to exclude the air, there will be a more violent inflammation and greater distress than in common cases, because the testicle will partake of the inflammation.

DESCRIPTION

Fig. 2nd.

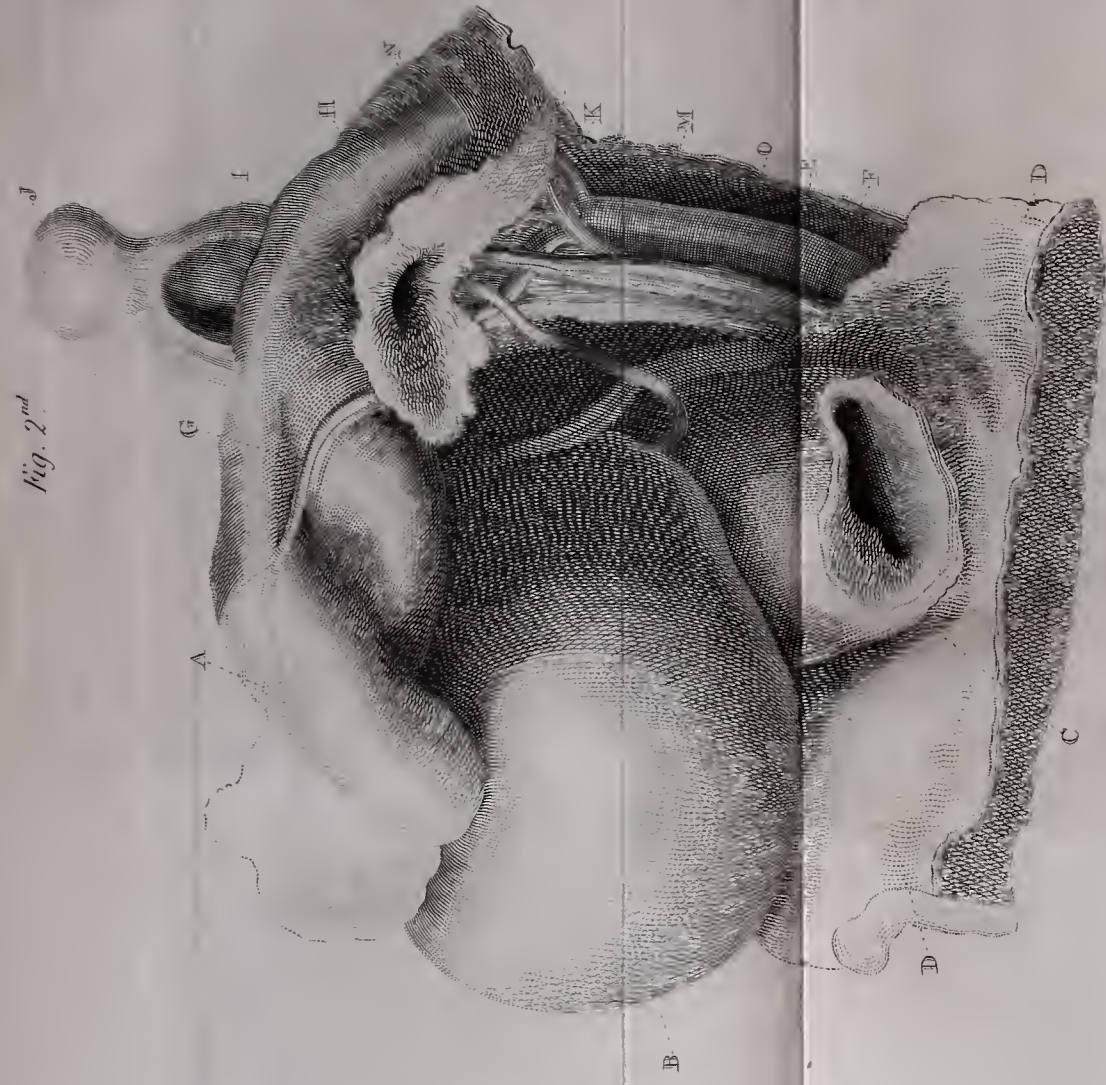


Fig. 1st.



EXPLANATION

OF THE

TABLES.

TAB. I. FIG. I.

REPRESENTS a large praeternatural aperture in the mesentery of a woman, through which a considerable portion of the intestinum ileum had passed and been strangulated. The patient had the usual symptoms of inflammation of the bowels before her death.

The plate represents the bowels as distended by air; the mesentery is seen somewhat like a cord; and the intestines passing through the praeternatural aperture in it.

1. 2. 3. 4. 5. 6. 7. 8. 9. point out the successive turns of the intestines. This plate is half the size of nature.

FIG. II.

Represents an inside view of the pelvis of a boy who had laboured under scrotal hernia. The plate is of the same size as nature.

A, the rectus abdominis turned forwards.

B, the bladder of urine.

C, the rectum.

DD, part of the os sacrum, covered by membrane.

E, the external iliac artery.

F, the external iliac vein.

G, the epigastric artery, sent off from the external iliac artery; is seen passing behind the spermatic cord and vas deferens, and then along the inner side of the neck of herniary sac H, to the rectus abdominis A.

IJ, a fore shortened view of the under part of the herniary sac and testicle.

K, the beginning of the circumflex artery.

M, the spermatic cord, with its artery and vein injected, passing over the epigastric artery, and then behind the herniary sac.

N, the vas deferens passing behind the herniary sac; crossing the epigastric artery G; and then going backwards between the rectum and bladder of urine.

O, the umbilical artery.



Fig. 2.

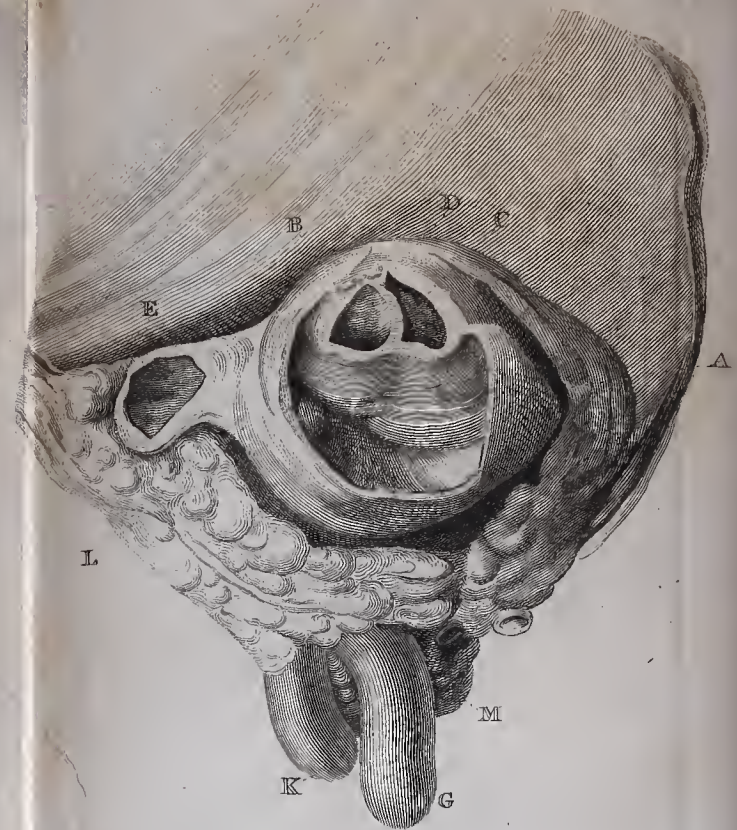


Fig. 3.

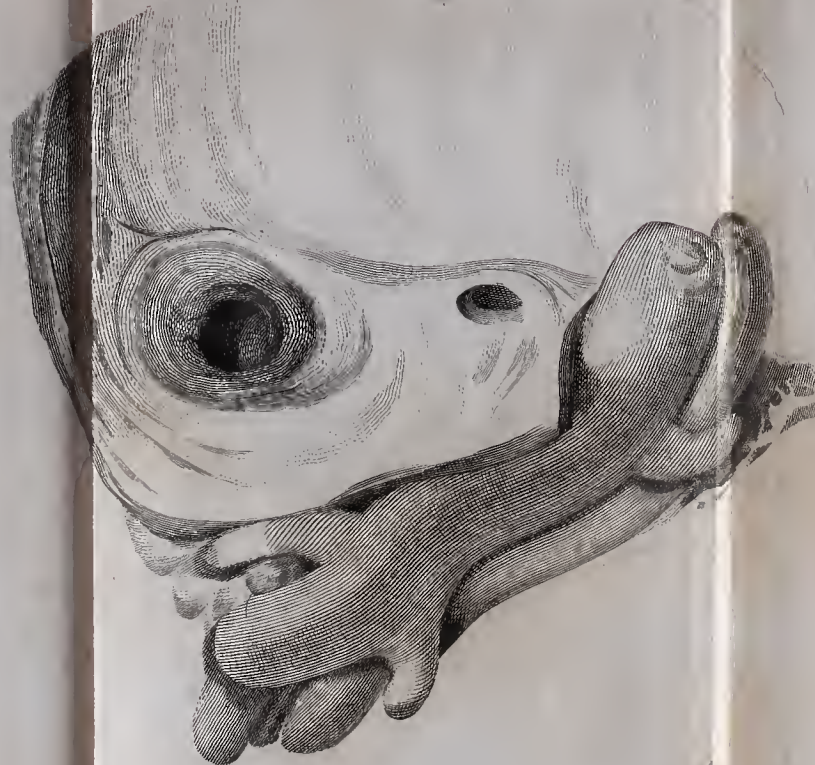
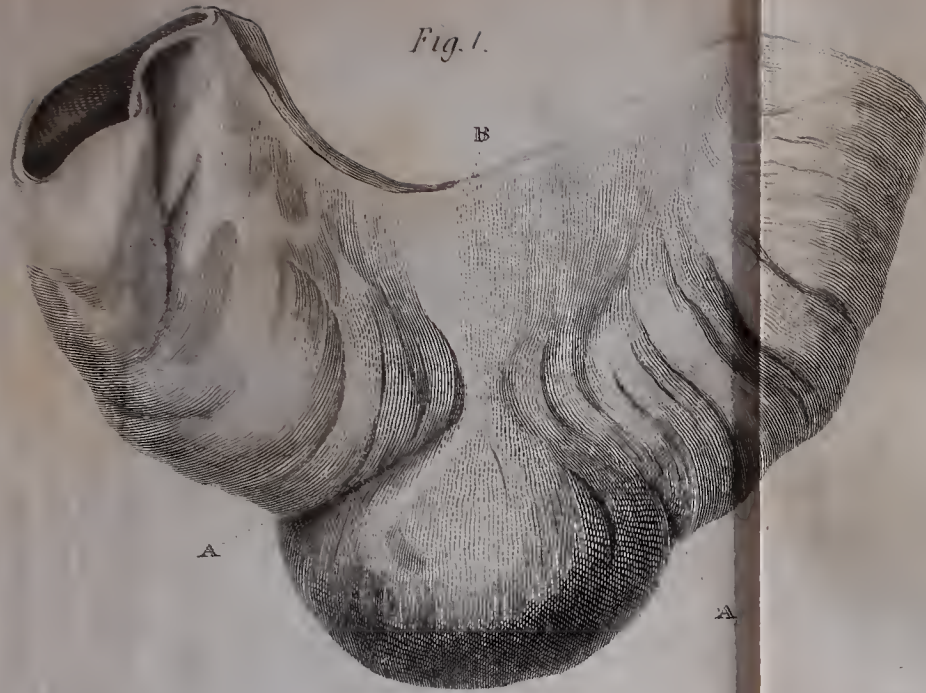


Fig. 1.



T A B. II. F I G. I.

Represents a portion of the ileum, part of which had been strangulated within a herniary sac.

The marks of the stricture are seen at AA.

The portion of intestine below the stricture was of a deep purple colour, and the surface of it was covered by a very thin layer of coagulable lymph.

B, a portion of the mesentery.

F I G. II.

Represents a singular instance of plurality of sacs: in this instance there were four herniary sacs. The largest, A, was filled with bloody water. A part of this herniary sac was removed to show two smaller sacs, B and C, within it: these seemed to be separated from each other by the septum D, which is very thin posteriorly.

E, a small sac at the side of the largest sac A.

The sacs A and E communicate laterally at L; as may be seen by the light coming through the opening.

B and C do not communicate.

The sac B communicates with the sac A, by a small rounded opening in the posterior part, which cannot be represented in this view of the parts.

Condensed cellular substance and fat surround the herniary sacs,

GK, the femoral artery, and its great branch, arteria profunda.

M, the femoral vein.

FIG. III.

Represents an inside view of the same preparation.

A portion of the abdominal muscles covered by the peritoneum A.

B and C, two passages through the abdominal muscles.

The smaller aperture does not communicate with any of the sacs, and does not go very far.

B, the larger aperture communicates only with the sac C.

EE, the external iliac artery vein.

The figures in this plate represent the parts of their natural size.



Fig. 2nd.

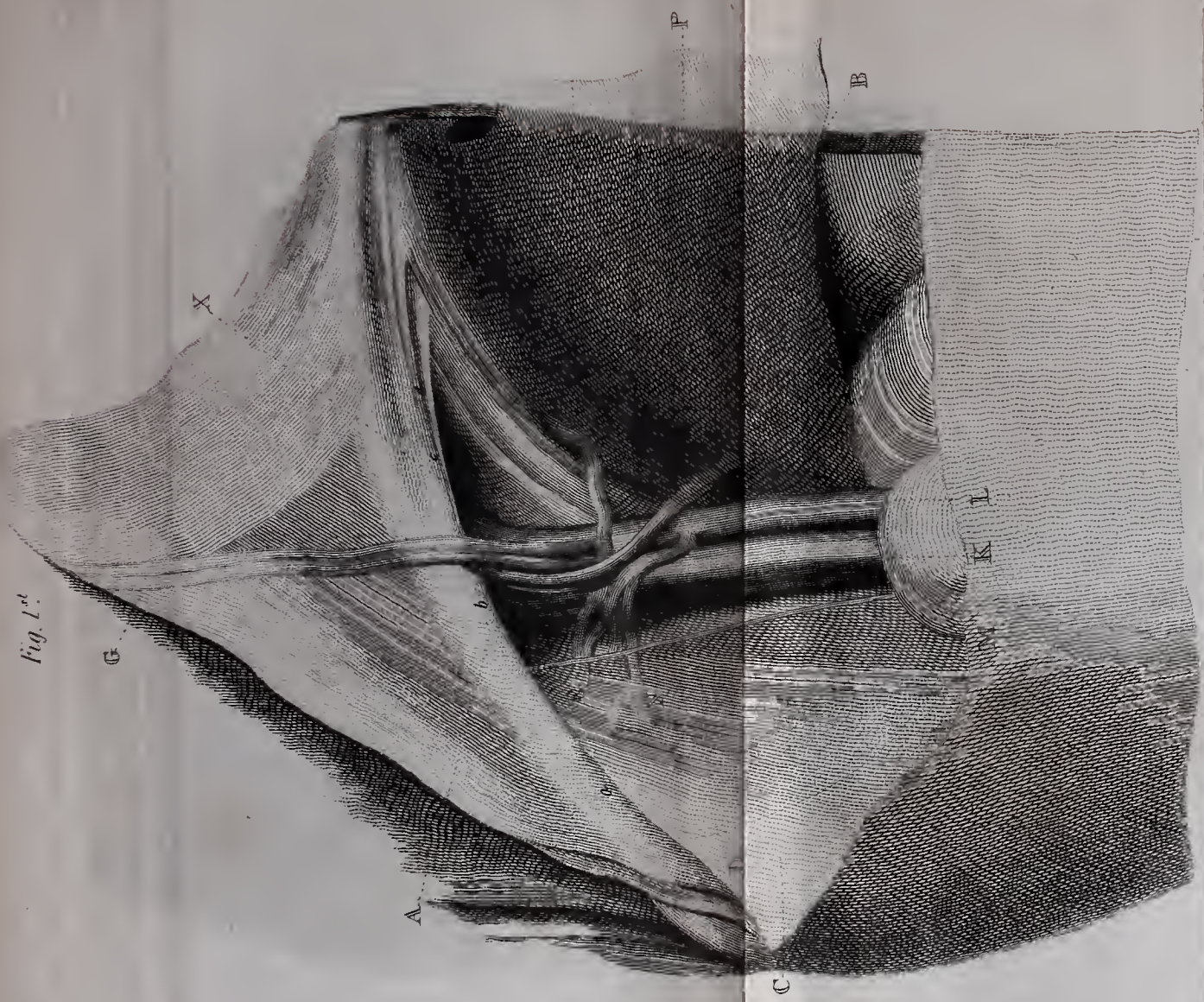


Fig. 1st.

T A B. III. FIG. I.

Gives an inside view of the left side of the pelvis of a woman.

The reader is supposed to be looking obliquely down towards the fore part of the pelvis.

The peritoneum is removed, in order to show the parts which were obscurely seen through it.

A, the round ligament of the uterus passing in a canal ; the posterior part of which is strengthened by the under portion of the internal edge of the crural arch.

b, c, d, point out the inner side of Poupart's ligament, or the internal edge of the crural arch : c and d represent the portion divided by Gimbernat in his operation for crural hernia.

CDN, the tendinous aponeurosis covering the internal iliac muscle, consisting of fibres running longitudinally ; others pass transversely ; it is interwoven with the crural arch in such a manner, as is seen at A, that herniae cannot happen between the external iliac artery and the ileum, or between b and C.

From the tendinous aponeurosis covering the iliac muscle, a membrane passes behind the external iliac artery K, and its corresponding vein L. This membrane is inserted into the edge of the pectineus muscle, and is attached to the pubis, where it is united with the duplicature of the arch pointed out by the letters c, d, which terminates

in the same spine of the pubis : a ligament is thus formed, below which the pectineus muscle is inserted.

From the crural arch, there arises an aponeurotic sheath : this is the inner side of the uppermost part of the origin of the fascia lata of the thigh : this forms the anterior part of the sheath, which encloses part of the external iliac blood-vessels.

The iliac blood-vessels K and L, and a few lymphatic glands, enter into this sheath.

One of the crural nerves is seen passing on the outer side of the external iliac artery K.

The epigastric artery G is sent off from the external iliac artery K, before it enters the sheath ; and, with its corresponding vein, passes obliquely inwards, on the inner side of the round ligament of the uterus A. The obturator artery is seen passing inwards to the foramen obturatorium : in this instance, it arises from the same part of the external iliac artery, as the epigastric artery.

The circumflex artery E passes outwards.

X, an aperture on the inner side of the external iliac vein L; which is, in some subjects, filled up by a small lymphatic gland ; through this the bowels protrude, and form a crural hernia.

The external iliac blood-vessels K and L fill up the principal part of the orifice of the sheath : the round ligament of the uterus A shuts up a little of the external side of it.

The epigastric artery and vein cover its anterior and internal part, on their way to the rectus muscle of the abdomen.

RRR, part of the external oblique muscle, and rectus muscle of the abdomen.

The parts represented in this table are reduced to two thirds of their natural diameter.

FIG. II.

Represents a sac of a crural hernia.

It adhered to the neighbouring fat and cellular substance: hence it appears considerably thicker in some places than others.

A, its narrow neck.

B, the cavity of the sac perfectly smooth when it was first opened; but is now a little corrugated, from having been preserved for a long time in spirits.

This figure is of the natural size.

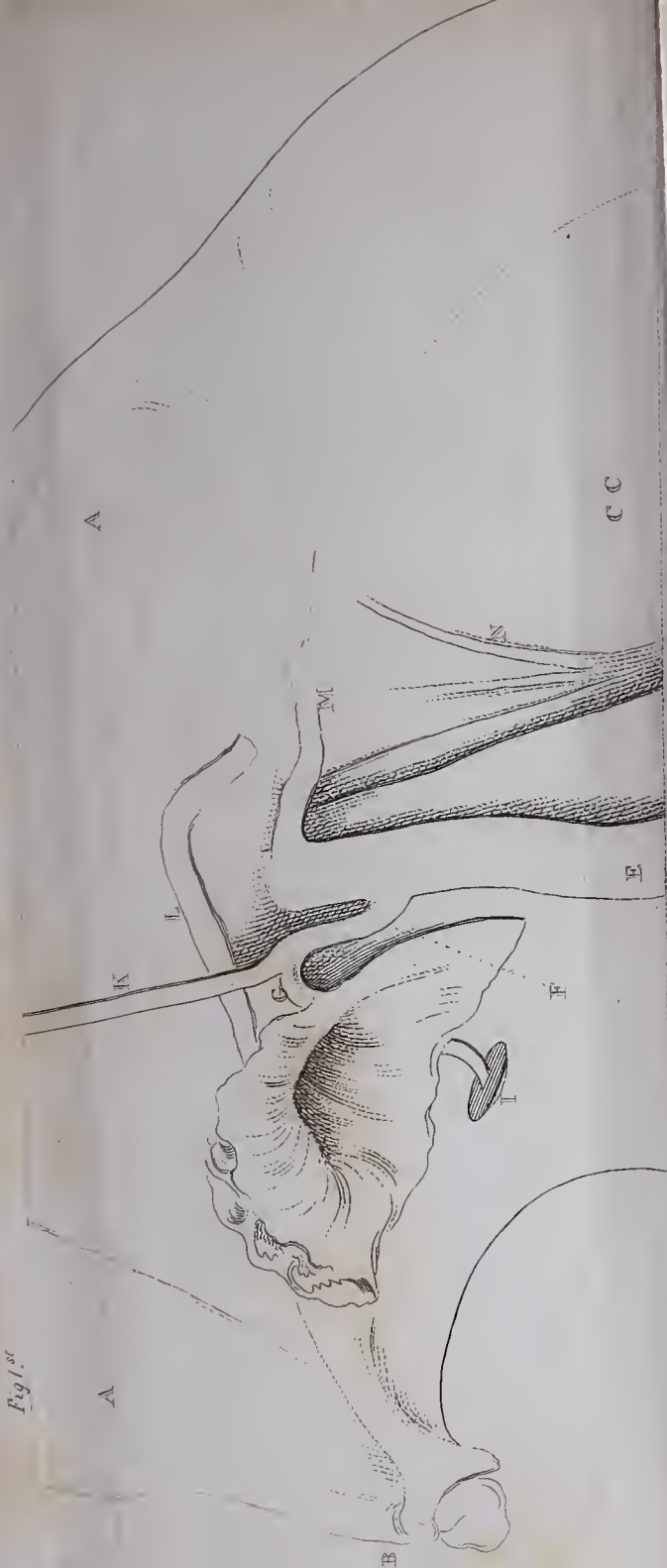
Fig 1stFig. 2nd

PLATE IV. FIG. I.

Gives an inside view of the right side of the pelvis of a woman, who died in consequence of crural hernia. The abdominal muscles AA were turned forwards.

B, the under part of the rectus abdominis.

CC, A part of the iliacus internus muscle.

D, a part of the psoas muscle.

E, the external iliac artery.

In this case, there was a *lusus naturae* with respect to the origin of the obturator artery.

F, a trunk common to the obturator and epigastric arteries.

G, the obturator artery passing behind and on the outer side of the neck of herniary sac, to pass through the foramen obturatorium I.

K, the epigastric artery passing on the outer side of the herniary sac, and crossing the round ligament of the uterus L, on its inner side.

M, the circumflex artery passing outwards, and towards the os ileum.

N, a small nerve, derived from the lumbar nerves, passing along the iliacus internus muscle.

In this instance, the parts are nearly of their natural size.

FIG. II.

Gives an inside view of the left side of the pelvis of the male.

The parts in the plate are represented of their natural size.

AAA, point out the abdominal muscles turned forwards and downwards.

B, a portion of the iliacus internus muscle.

C, a portion of the psoas magnus muscle.

D, the external iliac artery.

E, the circumflex artery.

F, the epigastric artery.

G, the external iliac vein.

H, the epigastric vein.

I, the spermatic cord.

G, vas deferens.

KKK, nerves from the lumbar plexus.

LMN, the internal edge of the crural arch.

That part, marked N, is much broader than in the female pelvis.

The aperture X on the internal side of the external iliac vein is of a different shape and size from that of the female pelvis.

O, the crest of the pubis.

Fig. 1^a

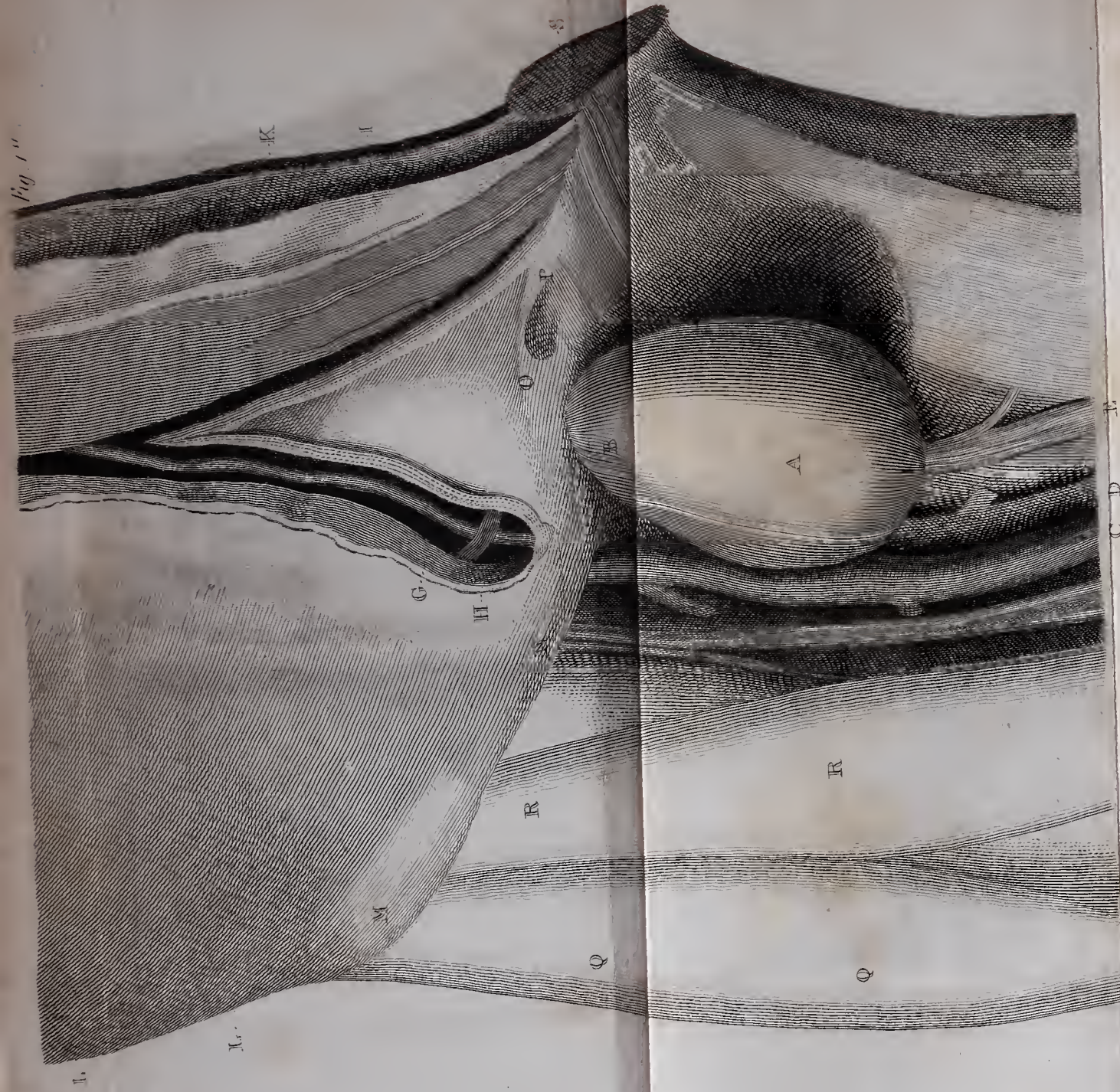
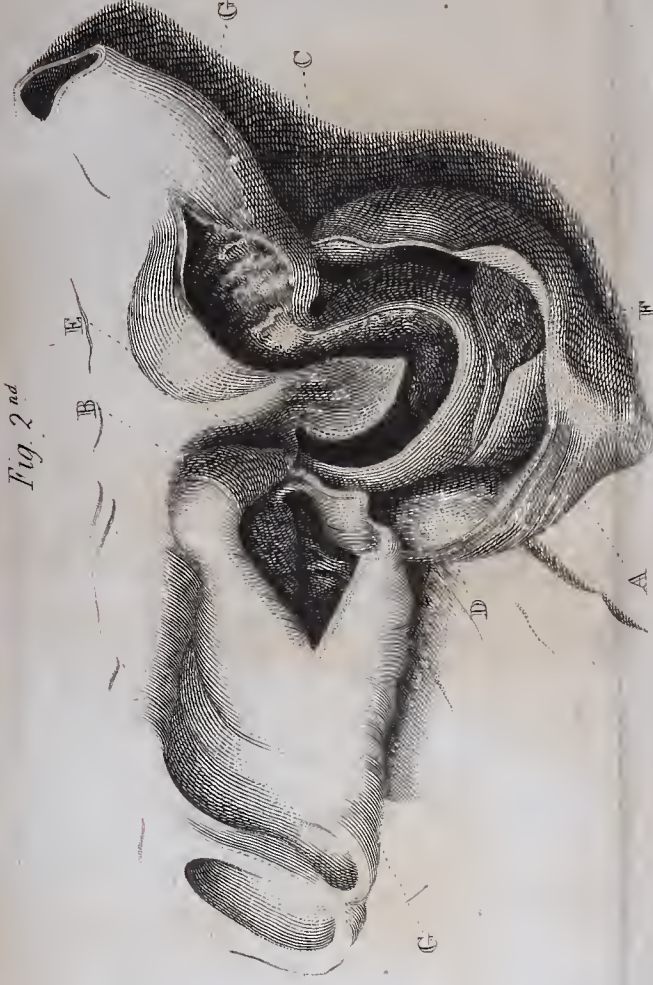


Fig. 2^{ad}



TAB. V. FIG. I.

Represents a front view of the relative situation of the crural herniary tumour with respect to the neighbouring blood-vessels and nerves, on the right side of the body.

The parts are represented of their natural size : it was taken from the same woman as fig. 1st of plate 4th.

A, the herniary tumour.

B, the neck of the tumour.

C, the femoral artery. The anterior crural nerves are seen on the outer side of the artery.

D, femoral vein.

E, the vena saphena.

A portion of the abdominal muscles was cut out, in order to show the true situation and course of the epigastric artery G.

H, round ligament of the uterus crossing the epigastric artery.

I, the under part of the rectus abdominis.

K, tendinous membrane turned back, which covered the rectus abdominis.

MNO, the under part of the tendon of the oblique muscle, called crural arch.

FIG. II.

Represents a fore view of a portion of the ileum contained within a herniary sac of a crural hernia.

The sac A adhered to the neighbouring fat; and therefore appears uneven on its surface, and much thicker in some places than in others.

The neck of the sac was narrower than any other portion of it. The engraving represents the sac after it was opened; in consequence of which, the opposite sides of it have receded to a considerable distance from each other.

The protruded portion of intestine was fixed to the bottom of the herniary sac AA, by means of a layer of coagulable lymph F.

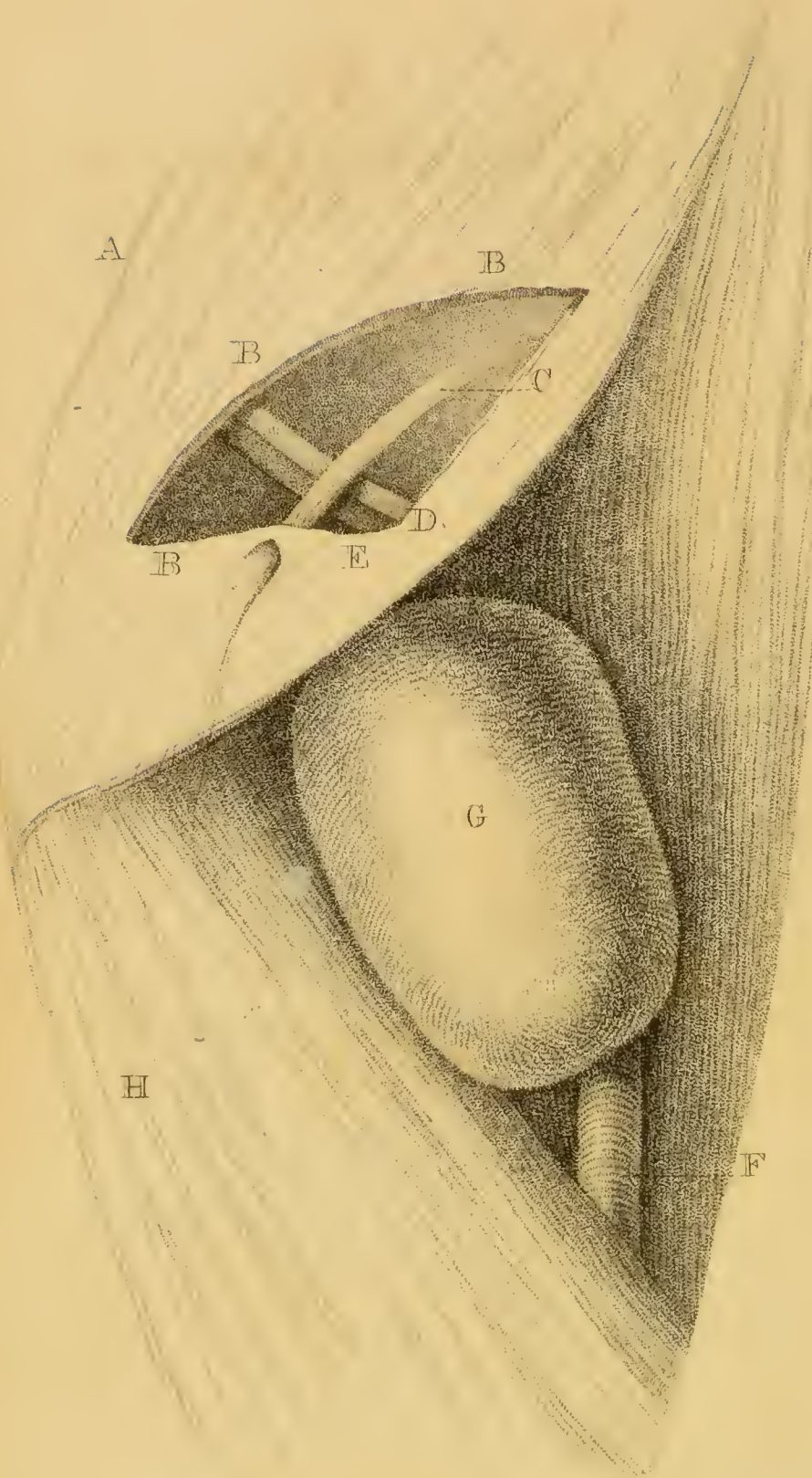
The protruded portion of intestine had dragged down along with it a portion of the mesentery B.

The cavity of the protruded portion of intestine was nearly filled by coagulable lymph, except at that part of it represented by the letter C.

At the letter E, there was so complete an obstruction, that not even a small probe could be passed from the upper to the under part of the strangulated intestine.

F, a layer of coagulable lymph uniting the protruded portion of bowel to the herniary sac.

GG point out the appearance of the intestine on each side of the protruded portion of intestine.



T A B. VI.

Gives a view of the situation and size of a crural hernia on the left side of the body of a woman.

A portion of the abdominal muscles was cut out, in order to show the relative situation of the epigastric artery, and vein, and round ligament of the uterus, with respect to the tumour.

A, the abdominal muscles.

BBB, point out the portion of abdominal muscles which was cut out.

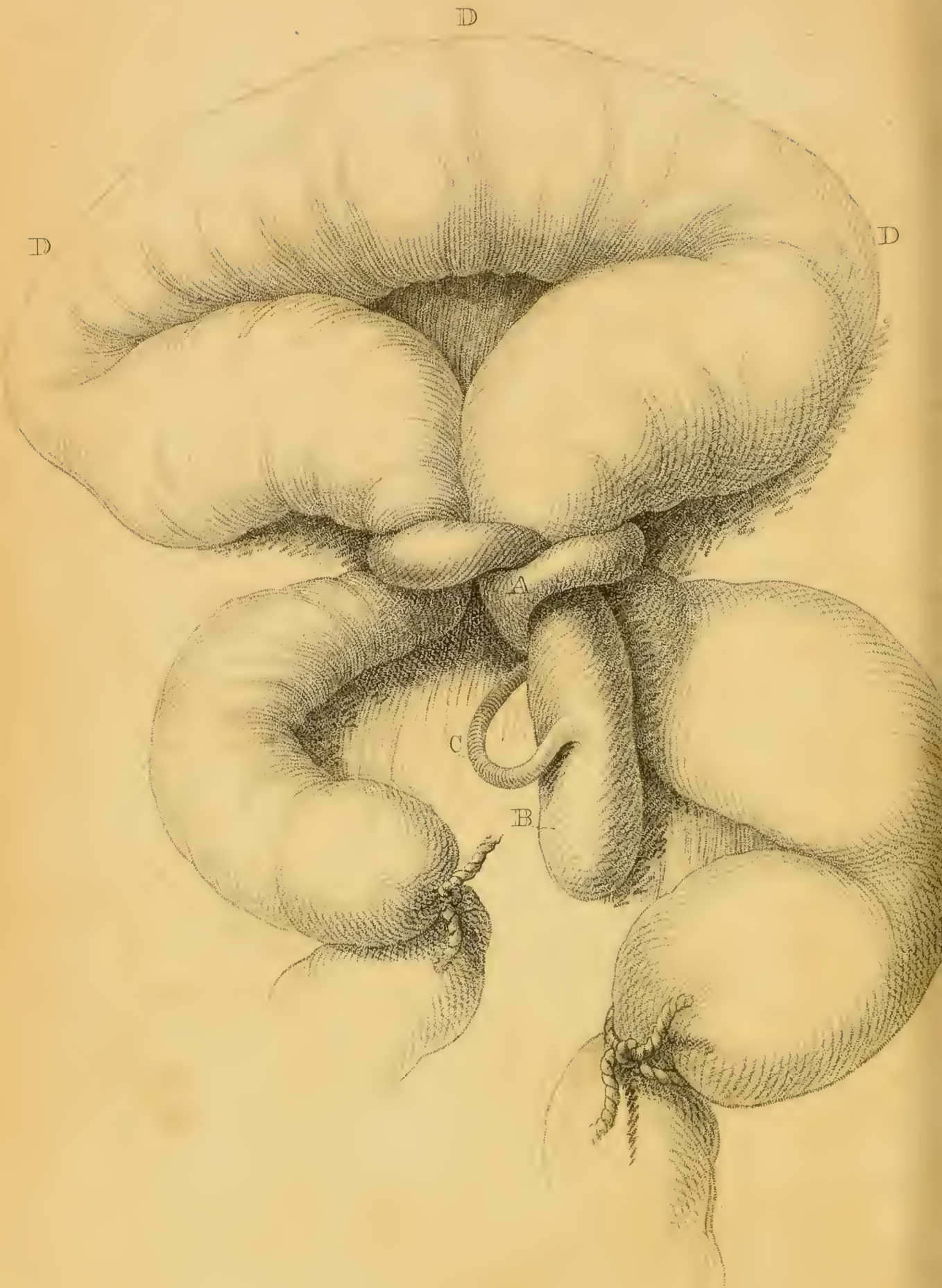
C, the round ligament of the uterus.

D, the epigastric artery.

E, the epigastric vein.

F, the femoral artery.

G, the herniary sac placed on the inner side of the artery, and considerably flattened from the pressure of the tendinous aponeurosis of the muscles of the thigh.



P L A T E VII.

Shows an example of what may be called internal hernia. In this instance, a processus caecus, denoted by the letters AB, passed around, and strangulated a portion of intestine, marked by the letters DDD.

The patient died of ileus.

The ligament C unites this unusual process to the mesentery.

A D D E N D A.

By mistake, a variety of internal hernia (which is probably more frequent than any other) was not mentioned in its proper place ; viz. That in which the bowels enter into the upper aperture, but do not pass out at the lower and external aperture of the ring of the abdominal muscles.

I had occasion lately to see an instance, in which there were two obturator veins on the same side. One of these accompanied the obturator artery, which arose from the external iliac artery, and terminated in the external iliac vein. The other obturator vein terminated in the hypogastric vein.



6-4

